DOCUMENT RESUME

ED 396 158 CE 071 910

TITLE	Characteristics of Competency. Measurement Criteria for Entry-Level Electronics Technician Skills..
INSTITUTION	Electronic Industries Foundation, Washington, DC.
SPONS AGENCY	Office of Vocational and Adult Education (ED), Washington, DC.
PUB DATE	[Jun 94]
NOTE	333p.; For the related standards manual, see CE 071 909; for other related documents, see ED 389 946 and CE 071 858-860.
AVAILABLE FROM	Electronic Industries Foundation, 919 18th Street, N.W., Suite 900, Washington, DC 20006 (IBM-compatible 3.5" diskette in WordPerfect 5.1+, free).
PUB TYPE	Legal/Legislative/Regulatory Materials (090) -- Guides - Non-Classroom Use (055)
EDRS PRICE	MF01/PC14 Plus Postage.
DESCRIPTORS	*Basic Skills; Communications; Competence; Competency Based Education; Critical Thinking; Electric Circuits; Electromechanical Technology; *Electronic Technicians; Entry Workers; *Equipment Maintenance; Error Correction; Guides; Interpersonal Relationship; Job Analysis; *Job Skills; Lasers; Mathematics Skills; Occupational Information; Physics; Postsecondary Education; *Problem Solving; Reading Skills; Repair; Science Process Skills; Secondary Education; Teamwork; Technology Education; Troubleshooting; Work Attitudes; *Work Ethic
IDENTIFIERS	National Standards

ABSTRACT

This supplement to "Raising the Standard" details the knowledge and skills required to successfully achieve competence in each of the tasks identified in the standards manual. It is divided into five sections that correspond to the five skill categories for entry-level electronics technician: additional skills, desirable behavior and work habits, test equipment and tools, and technical skills. For each skill, these components are provided in a one-page format: occupation, proficiency area, skill, measurement criteria, and results. An index contains lists of all skills, which are divided into the five skill categories. (YLB)

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ED 396 158

Characteristics of Competency

Measurement Criteria for Entry-Level Electronics Technician Skills

Electronic Industries Foundation

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Dear Electronics Technician Skill Standards Users:

The Electronic Industries Foundation and its parent organization, the Electronic Industries Association, are pleased to provide a supplement to *Raising the Standard*, the manual of skill standards for work-ready, entry-level electronics technicians. *Characteristics of Competency – Measurement Criteria for Entry-Level Electronics Technician Skills* details the knowledge and skills required to successfully achieve competence in each of the tasks identified in the standards manual.

For compact storage and easy use, we have issued *Characteristics of Competency – Measurement Criteria for Entry-Level Electronics Technician Skills* on an IBM-compatible 3-1/2" high-density diskette in Word Perfect 5.1+, which can be read using either Word Perfect 5.1 or Word Perfect 6.0.

You may print, reproduce, and convert this disk for your use as long as any resulting products are not sold or are not used as part of another product sold for profit.

This disk contains 7 files as follows:

File Name	File Content
README.	Introduction to and list of files for the measurement criteria disk
INDEX.	Listing of all skill standards statements. Skill standards numbers coincide with measurement criteria numbers
ADDITNL.SKL	Measurement criteria for the **Additional Skills** listed in the skill standards
BEHAVR.SKL	Measurement criteria for the **Desirable Behavior and Work Habits** in the skill standards
BASIC.SKL	Measurement criteria for the **Basic and Practical Skills** in the skill standards
TESTEQUP.SKL	Measurement criteria for the **Test Equipment and Tools** skills in the skill standards
TECH.SKL	Measurement criteria for the **Technical Skills** in the skill standards

Thank you.

Electronic Industries Foundation

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

A. Communication
B. Electromechanics
C. Lasers

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

A. Communication

Skill: A.01 Transmission line applications

MEASUREMENT CRITERIA

1. Described various types of transmission lines.
2. Identified the type of transmission line and enhancement devices to be used in various situations.

RESULTS:

Demonstrated knowledge of communication by describing the basics of transmission line applications.

Occupation: Entry-Level Electronics Technician

A. Communication

Skill: A.02 Antenna systems

MEASUREMENT CRITERIA

1. Explained the significance of the antenna system to a communications circuit.
2. Listed various types of antennas.

RESULTS:

Demonstrated knowledge of antenna systems by describing the basics of transmission systems including transmitting and receiving antenna systems.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

A. Communication

Skill: A.03 Types of multiplexing systems

MEASUREMENT CRITERIA

1. Described how multiplex transmission is achieved.
2. Identified methods of multiplex transmission.
    - A. Frequency-division multiplex
    - B. Time-division multiplex

RESULTS:

Demonstrated knowledge of types of multiplexing systems by describing the basics of multiplexing systems.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

A. Communication

Skill: A.04 Data Communications

MEASUREMENT CRITERIA

1. Described the various systems used in data communications.
2. Listed and explained the advantages and disadvantages of each method for transferring data.
   - A. Analog
   - B. Digital
3. Described concepts and applications of error detection and correction.
4. Described the concepts and applications of data compression and decompression.

RESULTS:

Demonstrated knowledge of data communication by describing the basics of data communications systems.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

A. Communication

Skill: A.05 Types of telephone switching systems

MEASUREMENT CRITERIA

1. Explained the functions of switching networks.
2. Described the various types and service availabilities of switching networks.
3. Described features available for linking individuals.

RESULTS:

Demonstrated knowledge of telephone switching systems by completing each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

A. Communication

Skill: A.06 Microwave communications systems

MEASUREMENT CRITERIA

1. Explained the functioning of microwave communications, including advantages and disadvantages.
2. Described safety procedures for avoiding exposure to microwaves.
3. Applied knowledge of microwaves to an explanation of microwave repeaters.
4. Described basics of satellite communication systems.

RESULTS:

Demonstrated knowledge of microwave communication systems by completing each of the identified activities.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

B. Electromechanics

Skill: B.01 Servomechanisms, motors, and motor control circuits

MEASUREMENT CRITERIA

1. Explained the principles/theory of servomechanisms, motors, and motor control circuits.
2. Listed applications of servomechanisms, motors, and motor control circuits.
3. Described open and closed loop control systems.

RESULTS:

Demonstrated understanding of servomechanisms, motors, and motor control circuits, pneumatic and mechanical power sources by completing each of the activities.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

B. Electromechanics

Skill: B.02 Hydraulic and pneumatic systems

MEASUREMENT CRITERIA

1. Explained the principles/theory of hydraulic and pneumatic systems to Electromechanics.
2. Listed applications of hydraulic and pneumatic systems in Electromechanics.

RESULTS:

Demonstrated basic understanding of hydraulic and pneumatic systems by completing each of the activities.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

B. Electromechanics

Skill: B.03 Mechanical power transmission systems

MEASUREMENT CRITERIA

1. Explained the principles/theory of the operation of mechanical power transmission systems.
2. Listed applications of mechanical power transmission systems.

RESULTS:

Demonstrated basic understanding of mechanical power transmission systems by completing each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

B. Electromechanics

Skill: B.04 Vacuum systems and components

MEASUREMENT CRITERIA

1. Explained the principles/theory of operation of vacuum systems and components.
2. Listed types and applications of vacuum systems and components.

RESULTS:

Demonstrated basic understanding of vacuum systems and components by completing each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

B. Electromechanics

Skill: B.05 Mechanisms, linkages and levers

MEASUREMENT CRITERIA

1. Explained the principles/theory of mechanisms, linkages and levers.
2. Listed types and applications of mechanisms, linkages and levers.

RESULTS:

Demonstrated basic understanding of mechanisms, linkages, and levers by completing each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

B. Electromechanics

Skill: B.06 Transducers and instrumentation

MEASUREMENT CRITERIA

1. Explain the principles/theory of transducers and instrumentation.
2. Listed types and applications of transducers.
3. Listed types and uses of instrumentation.

RESULTS:

Demonstrated basic understanding of transducers and instrumentation systems by completing each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

B. Electromechanics

Skill: B.07 Industrial materials

MEASUREMENT CRITERIA

1. Described the regulatory process for dealing with hazardous material.
2. Followed manufacturer's directions for the handling and disposal of all industrial materials.
3. Described representative safety needs and practices.

RESULTS:

Demonstrated basic understanding of safe use of industrial materials by the completion of each activity. Accepted safety, fabrication, and measurement procedures were followed.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

B. Electromechanics

Skill: B.08 Automatic controls and robotics

MEASUREMENT CRITERIA

1. Described the main components of robotics and automatic controls.

RESULTS:

Demonstrated knowledge of automatic controls and robotics by completion of the activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

C. Lasers

Skill: C.01 Welding, cutting and drilling

MEASUREMENT CRITERIA

1. Described use of lasers in welding, cutting, and drilling.
2. Explained safety concerns in the use of lasers in welding, cutting, and drilling.
3. Listed general applications of lasers used in welding, cutting, and drilling.
4. Observed lasers in use in welding, cutting, and drilling when feasible.

RESULTS:

Demonstrated knowledge of the application of lasers involved in welding, cutting, and drilling by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

C. Lasers

Skill: C.02 Data recording and manipulation

MEASUREMENT CRITERIA

1. Described the use of lasers in data recording and manipulation.
2. Explained safety concerns in the use of lasers in data recording and manipulation.
3. Listed general applications of lasers used in data recording and manipulation.
4. Observed lasers in use in data recording and manipulation.

RESULTS:

Demonstrated knowledge of the application of lasers involved in data recording and manipulation by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

C. Lasers

Skill: C.03 Environmental testing and monitoring

MEASUREMENT CRITERIA

1. Described the use of lasers in environmental testing and monitoring.
2. Explained safety concerns in the use of lasers in environmental testing and monitoring.
3. Listed general applications of lasers used in environmental testing and monitoring.
4. Observed lasers in use in environmental testing and monitoring when feasible.

RESULTS:

Demonstrated knowledge of the application of lasers involved in environmental testing and monitoring by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

C. Lasers

Skill: C.04 Nondestructive testing

MEASUREMENT CRITERIA

1. Described the use of lasers in nondestructive testing.
2. Explained safety concerns in the use of lasers in nondestructive testing.
3. Listed general applications of lasers used in nondestructive testing.
4. Observed lasers in use in nondestructive testing when feasible.

RESULTS:

Demonstrated knowledge of the application of lasers involved in nondestructive testing by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

C. Lasers

Skill: C.05 Measurement

MEASUREMENT CRITERIA

1. Described the use of lasers in measurement.
2. Explained safety concerns in the use of lasers in measurement.
3. Listed general applications of lasers used in measurement.
4. Observed lasers in use in measurement when feasible.

RESULTS:

Demonstrated knowledge of the application of lasers involved in measurement by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

C. Lasers

Skill: C.06 Communications

MEASUREMENT CRITERIA

1. Described the use of lasers in communications.
2. Explained safety concerns in the use of lasers in communications.
3. Listed general applications of lasers used in communications.
4. Observed lasers in use in communications when feasible.

RESULTS:

Demonstrated knowledge of the application of lasers involved in communications by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

C. Lasers

Skill: C.07 Fiber optics and lasers

MEASUREMENT CRITERIA

1. Described the use of lasers in fiber optics.
2. Explained safety concerns in the use of lasers in fiber optics.
3. Listed general applications of lasers used in fiber optics.
4. Observed lasers in use in fiber optics when feasible.

RESULTS:

Demonstrated knowledge of the application of lasers involved in fiber optics by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

C. Lasers

Skill: C.08 Lasers in medicine

MEASUREMENT CRITERIA

1. Described the use of lasers in medicine.
2. Explained safety concerns in the use of lasers in medicine.
3. Listed general applications of lasers used in medicine.
4. Observed lasers in use in medicine when feasible.

RESULTS:

Demonstrated knowledge of the application of lasers involved in medicine by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Additional Skills

C. Lasers

Skill: C.09 Holography/interferometer

MEASUREMENT CRITERIA

1. Described the use of lasers in holography/interferometer.
2. Explained safety concerns in the use of lasers in holography/interferometer.
3. Listed general applications of lasers used in holography/interferometer.
4. Observed lasers in use in holography/interferometer when feasible.

RESULTS:

Demonstrated knowledge of the application of lasers involved in holography/interferometer by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

A. Technical Literacy
B. Communicating on the Job
C. Solving Problems and Critical Thinking
D. Reading
E. Proficiency in Mathematics
F. Proficiency in Physics

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

A. Technical Literacy

Skill: A.01 Demonstrate basic keyboarding skills

MEASUREMENT CRITERIA

1. Demonstrated use of keyboard to enter data and to control specified computer functions.
2. Demonstrated ability to keyboard at a rate of 20 wpm with 5 errors maximum.
3. Explained the difference between keyboarding and other data entry devices.

RESULTS:

Demonstrated knowledge of keyboarding and other data entry devices by the completion of each activity. Information was correctly stored in the computer. The work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

A. Technical Literacy

Skill: A.02 Demonstrate ability to use standard applications software such as word processors, database management, and spreadsheets

MEASUREMENT CRITERIA

1. Performed editing using word processing.
2. Entered information into an established data base, retrieved records from the data base.
3. Set up a spreadsheet to be used in recording information.
4. Reproduced an electronic circuit using a sketching applications program.
5. Accessed remote network using a communication software.

RESULTS:

Demonstrated knowledge of standard applications of software such as word processors, database management and spreadsheets by the completion of each activity. Accepted keyboarding procedures were followed. All work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

A. Technical Literacy

Skill: A.03 Maintain state-of-the-art skills through participation in in-service or other training

MEASUREMENT CRITERIA

1. Explained the need to stay up-to-date with technological changes related to the electronics field.
2. Identified publications available to provide technical information and information regarding training programs.
3. Located local electronics associations to identify changes taking place in the field.
4. Attended professional meetings of the electronics technicians.

RESULTS:

Demonstrated an understanding of the need to maintain state-of-the-art skills through participation in in-service or other training by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

A. Technical Literacy

Skill: A.04 Participate in continuing education

MEASUREMENT CRITERIA

1. Explained the need to continuously improve work skills through education.
2. Listed sources of continuing education classes.

RESULTS:

Demonstrated an awareness of the need to continue education through the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

A. Technical Literacy

Skill: A.05 Understand and apply continuous improvement principles (see data analysis)

MEASUREMENT CRITERIA

1. Described continuous improvement principles.
2. Provided examples demonstrating an understanding of continuous improvement principles.
3. Organized data into graphs or charts as needed.
4. Interpreted information from statistical information for purpose of improvement of processes/functions.

RESULTS:

Knowledge of continuous improvement processes was demonstrated through completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

A. Technical Literacy

Skill: A.06 Demonstrate knowledge of the business products/services

MEASUREMENT CRITERIA

1. Explained the importance of being knowledgeable about business products/services.
2. Listed ways of obtaining information about products/services.

RESULTS:

Demonstrated knowledge of business products/services by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

B. Communicating on the Job

Skill: B.01 Use effective written and other communication skills

MEASUREMENT CRITERIA

1. Followed direction for the completion of a task.
2. Completed the task without error.
3. Developed a written procedure for a technical process.
4. Provided an oral presentation describing a technical issue or process.
5. Demonstrated effective communication using written, verbal and non-verbal forms of communication.

RESULTS:

Demonstrated the ability to communicate effectively by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

B. Communicating on the Job

Skill: B.02 Use telephone etiquette including relaying messages accurately

MEASUREMENT CRITERIA

1. Described the importance of the telephone to business success.
2. Listed rules of etiquette for using the telephone.
3. Explained the procedure for recording a business message.

RESULTS:

Demonstrated the ability to apply telephone etiquette when answering the telephone and relaying messages by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

B. Communicating on the Job

Skill: B.03 Employ appropriate skills for gathering and retaining information

MEASUREMENT CRITERIA

1. Demonstrated ability to gather information by written and verbal means.
2. Demonstrated ability to interpret written and verbal information.
3. Contacted appropriate persons for pertinent information.
4. Maintained documentation of information gathered.

RESULTS:

Demonstrated ability to identify, locate, gather, and retain information by completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

B. Communicating on the Job

Skill: B.04 Interpret written, graphic and oral instructions

MEASUREMENT CRITERIA

1. Identified types of written, graphic and oral instructions and when they are used.
2. Interpreted written, oral and graphic instructions.
3. Described how to ask for clarification when giving or receiving instructions.
4. Demonstrated how to interpret graphic information.
5. Explained the importance of listening to complete instructions.
6. Illustrated the understanding of body language in interpreting oral directions.

RESULTS:

Demonstrated the ability to interpret written, graphic and oral instructions by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

B. Communicating on the Job

Skill: B.05 Interact with co-workers and customers in a logical, clear and understandable manner

MEASUREMENT CRITERIA

1. Demonstrated the different requirements when communicating with management, co-workers, and customers.
2. Interpreted body language in the communication process.
3. Demonstrated proper listening skills when communicating with co-workers and customers.
4. Described the effect of word stress and voice tone when communicating.
5. Demonstrated proper recording and relaying messages in a clear and concise manner.

RESULTS:

Demonstrated the ability to communicate in a logical, clear and understandable manner by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

B. Communicating on the Job

Skill: B.06 Use language appropriate to the situation

MEASUREMENT CRITERIA

1. Demonstrated use of appropriate job-specific terminology to describe work situation.
2. Defined job-specific words to customers when needed.
3. Communicated orally to customers avoiding derogatory, insulting and slang terminology.
4. Addressed co-workers and supervisors appropriately.

RESULTS:

Demonstrated use of appropriate language for designated situations in each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

B. Communicating on the Job

Skill: B.07 Participate in meetings in a positive and constructive manner

MEASUREMENT CRITERIA

1. Listed different kinds of business meetings.
2. Explained the roles of individuals in business meetings.
3. Participated appropriately in a mock business meeting.
4. Described the difference between positive and non-constructive meeting participation.

RESULTS:

Demonstrated the ability to participate in a meeting in a positive and constructive manner by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

B. Communicating on the Job

Skill: B.08 Use job-related terminology

MEASUREMENT CRITERIA

1. Explained job-related terminology in the electronics technician field in use with other electronics personnel.

RESULTS:

Demonstrated the ability to understand and use job related terminology in an appropriate situation by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

B. Communicating on the Job

Skill: B.09 Write technical reports, letters and memoranda as appropriate to the audience (e.g., management, customers, co-workers, and manufacturers)

MEASUREMENT CRITERIA

1. Followed basic format of business letters and memoranda to construct appropriate written material.
2. Used correct format and language in preparing technical reports for electronic technicians.
3. Explained how to modify written communications for different audiences(e.g. management, customers, co-workers and manufacturers).
4. Developed examples of various types of business communications.

RESULTS:

Demonstrated ability to write various technical reports, letters and memoranda to and for different audiences. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

B. Communicating on the Job

Skill: B.10 Document work projects, procedures, tests, and equipment failures

MEASUREMENT CRITERIA

1. Demonstrated proficiency in documenting work projects and procedures using appropriate methods.
2. Explained test documentation procedures.
3. Provided documentation tracking equipment failures, listing procedures used and test results to determine equipment failure.

RESULTS:

Demonstrated ability to appropriately document projects, procedures and equipment failures. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

C. Solving Problems and Critical Thinking

Skill: C.01 Identify the problem

MEASUREMENT CRITERIA

1. Explained how attitudes, beliefs and values influence perception of problems.
2. Determined that there was a problem in a given set of conditions.
3. Explained the process used to identify the problem.

RESULTS:

Demonstrated the ability to identify the problem by the completion of each activity. These activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

C. Solving Problems and Critical Thinking

Skill: C.02 Clarify purposes and goals

MEASUREMENT CRITERIA

1. Described goals and how they are affected by people, objects, or ideas.
2. Described factors that impacted problem and solution.
3. Developed statement of goals for problem solution.

RESULTS:

Demonstrated the ability to clarify purposes and goals by the completion of each activity. These activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

C. Solving Problems and Critical Thinking

Skill: C.03 Identify available solutions and their impact including evaluating credibility of information, and locating information

MEASUREMENT CRITERIA

1. Interpreted possible solution to a hypothetical problem and discussed possible impact of each solution.
2. Described several solutions to a hypothetical problem.
3. Identified possible sources of information for the resolution of a problem and determined the credibility of the information.

RESULTS:

Demonstrated the ability to identify solutions to problems and identify the impact of the solution by the completion of each activity. These activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

C. Solving Problems and Critical Thinking

Skill: C.04 Evaluate options

MEASUREMENT CRITERIA

1. Described how to analyze options.
2. Explained how different methods of solving problems will have different results.
3. Compared different options and explained how to test and choose best option for any given situation.
4. Listed the possible solutions to a problem and evaluated each solution to determine the best option.
5. Described criteria for making choice of option.

RESULTS:

Demonstrated the ability to evaluate a problem and arrive at the best option for solving the problem by the completion of each activity. These activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

C. Solving Problems and Critical Thinking

Skill: C.05 Set priorities

MEASUREMENT CRITERIA

1. Defined priorities.
2. Listed external and internal forces that effect the establishment of priorities.
    a. Values
    b. Attitudes
    c. Environment
    d. Other business factors
3. Prioritized a list of tasks and explained the reasons for prioritizing that way.

RESULTS:

Demonstrated the ability to set priorities by the completion of each activity. These activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

C. Solving Problems and Critical Thinking

Skill: C.06 Select/implement options/decisions including predicting results of proposed action

MEASUREMENT CRITERIA

1. Selected solution to the problem.
2. Described anticipated results of the solution.
3. Explained why the solution was selected.

RESULTS:

Demonstrated the ability to select and implement an option for the solution of a problem along with predicting the result of the action selected by the completion of each activity. The activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

C. Solving Problems and Critical Thinking

Skill: C.07 Organize personal workloads

MEASUREMENT CRITERIA

1. Described the need to plan the organization of workloads.
2. Listed reasons for the organization of a hypothetical workload.
3. Organized workload by:
    a. Work you must do
    b. Work assigned to others
    c. Work that must be done immediately
    d. Work that can wait
    e. Work that you would like to accomplish

RESULTS:

Demonstrated the ability to organize personal workloads by the completion of each activity. These activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

C. Solving Problems and Critical Thinking

Skill: C.08 Participate in brainstorming sessions to generate new ideas and solve problems

MEASUREMENT CRITERIA

1. Demonstrated appropriate team member behavior in group brainstorming session.
2. Identified potential new ideas and solutions to problems.
3. Explained how brainstorming teamwork creates new ideas for team problems.
4. Participated as a group member and leader in a brainstorming session.

RESULTS:

Demonstrated appropriate group roles in brainstorming sessions that produced new ideas for problems. The activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

D. Reading

Skill: D.01 Read and apply various sources of technical information (e.g., manufacturer literature, codes and regulations)

MEASUREMENT CRITERIA

1. Identified appropriate information from technical literature.
2. Identified appropriate sections of codes and regulations for electronics technician.
3. Demonstrated proficiency in reading codes and regulations pertinent to electronics technician.
4. Interpreted and applied information found in technical literature, codes and regulations.

RESULTS:

Demonstrated ability to read, interpret, and apply manufacturer's literature, codes and regulations by completing the activities. All activities were performed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.01 Determine if a solution is reasonable

MEASUREMENT CRITERIA

1. Demonstrated estimating ability
2. Demonstrated ability to select the most reasonable solution from several options.

RESULTS:

Demonstrated knowledge of estimating solutions by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.02 Demonstrate ability to use a simple electronic calculator

MEASUREMENT CRITERIA

1. Performed all calculations necesary for all appropriate mathematical functions.

RESULTS:

Demonstrated knowledge of the use of the calculator by the completion of this activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.03 Round and/or truncate numbers to designated place value

MEASUREMENT CRITERIA

1. Rounded numbers to designated place value.
2. Identified integer value of numbers.
3. Truncated numbers to designated number of decimals.

RESULTS:

Demonstrated knowledge of rounding and truncating numbers by the completion of each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.04. Compare, order and determine equivalencies of real numbers(e.g., fractions, decimals, percentages)

MEASUREMENT CRITERIA

1. Rank ordered a set of decimal numbers.
2. Rank ordered a set of fractions.
3. Rank ordered a set of percentages.
4. Rank ordered a set containing mixed fractions, decimals, and percentages.
5. Compared fractions, decimals and percentages to determine their equivalency.
6. Converted a set of fractions to their decimal equivalents.
7. Converted a set of fractions to their percentage equivalents.
8. Converted a set of decimal numbers to their fractional equivalents.
9. Converted a set of decimal numbers to their percentage equivalents.
10. Converted a set of percentages to their decimal equivalents.
11. Converted a set of percentages to their fractional equivalents.

RESULTS:

Demonstrated knowledge of real number equivalencies by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.05 Solve problems and make applications involving integers, fractions, decimals, percentages and ratios using order of operations

MEASUREMENT CRITERIA

1. Defined the order of operations in an equation.
2. Solved equations involving several different operations (i.e., parentheses, multiplication, division).
3. Solved equations involving different forms of numbers (i.e., integers, fractions, decimals, percentages) by performing operations in correct order.

RESULTS:

Demonstrated knowledge of integers, fractions, decimals, and percentages by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.06. Translate written and/or verbal statements into mathematical formulas

MEASUREMENT CRITERIA

1. Translated verbal statements of problems into appropriate mathematical formulas.
2. Translated written statements of problems into appropriate mathematical formulas.

RESULTS:

Demonstrated knowledge of conversion of verbal and written statemenmts into mathematical formulas by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.07 Compare, compute, and solve problems involving binary, octal, decimal, and hexadecimal numbering systems

MEASUREMENT CRITERIA

1. Defined "binary numbering system".
2. Defined "octal numbering system".
3. Defined "decimal numbering system".
4. Defined "hexadecimal numbering system".
5. Converted binary octal, decimal and hexadecimal numbers to their equivalent in the other systems.

RESULTS:

Demonstrated knowledge of binary, octal, decimal, and hexadecimal numbering by the completion of each activity. Appropriate number relations, measurements. analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.08 Convert, compare and compute with common units of measurement within and across measurement systems

MEASUREMENT CRITERIA

1. Converted measurements from metric to English system.
2. Converted measurements from English to metric system and temperatures between celsius, farenheit and kelvin systems.
3. Compared measurements to determine equivalency.
4. Solved problems involving measurements in metric system.
5. Solved problems involving measurements in English system.
6. Solved problems involving measurements from both systems in same statement.

RESULTS:

Demonstrated knowledge of measurement systems by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.09 Read scale on measurement devices and make interpolations where appropriate

MEASUREMENT CRITERIA

1. Demonstrated ability to correctly measure electrical quantities using various devices(i.e., meters, scopes).
2. Demonstrated ability to interpolate.

RESULTS:

Demonstrated knowledge of scales on measurement devices by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.10 Understand statistical terms and charts needed for interpretation of continuous improvement processes

MEASUREMENT CRITERIA

1. Defined commonly used statistical terms.
2. Described and demonstrated use of histogram.
3. Described and demonstrated use of Pareto diagram.
4. Described and demonstrated use of Bar chart.
5. Described and demonstrated use of Pie chart.
6. Described and demonstrated use of Run chart.
7. Described and demonstrated use of scatter diagram.

RESULTS:

Demonstrated knowledge of statistical terms and charts for continuous improvement process by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.11 Collect and organize data into tables, charts and/or graphs

MEASUREMENT CRITERIA

1. Used a data collection tool.
2. Described processes for collecting data using the data collection tool.
3. Prepared a table from a set of data.
4. Prepared a chart from a set of data.
5. Prepared a graph from a set of data.

RESULTS:

Demonstrated knowledge of tables, charts, and graphs by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.12 Interpret and use tables, charts, maps and/or graphs

MEASUREMENT CRITERIA

1. Interpreted and described the use of a table.
2. Interpreted and described the use of a chart.
3. Interpreted and described the use of a map.
4. Interpreted and described the use of a graph.
5. Compared uses, differences, and applicability of each.

RESULTS:

Demonstrated knowledge of use and interpretation of tables, charts, maps, and graphs by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.13 Identify patterns, note trends, and/or draw conclusions from tables, charts, maps and/or graphs

MEASUREMENT CRITERIA

1. Identified patterns and/or trends from a table.
2. Identified patterns and/or trends from a chart.
3. Identified patterns and/or trends from a map.
4. Identified patterns and/or trends from a graph.
5. Drew logical conclusions from pattern or trend identified.

RESULTS:

Demonstrated ability to identify patterns, note trends, and draw conclusions from tables, charts, maps, and graphs by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.15 Simplify and solve algebraic expressions and formulas

MEASUREMENT CRITERIA

1. Simplified algebraic expressions.
2. Solved algebraic formulas.

RESULTS:

Demonstrated knowledge of algebraic expressions and formulas by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.16 Select and use formulas appropriately

MEASUREMENT CRITERIA

1. Selected an appropriate formula to solve a problem.
2. Demonstrated use of an appropriate formula to solve a problem.

RESULTS:

Demonstrated ability to select and use formulas by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.17 Understand and use scientific notation

MEASUREMENT CRITERIA

1. Defined "scientific notation".
2. Converted numbers from scientific notation to decimal notation.
3. Converted numbers from decimal notation to scientific notation.
4. Performed multiplication using scientific notation.
5. Performed addition using scientific notation.
6. Performed division using scientific notation.
7. Performed subtraction using scientific notation.

RESULTS:

Demonstrated an understanding and use of scientific notation by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.18 Use properties of exponents and logarithms

MEASUREMENT CRITERIA

1. Defined commonly used terms.
2. Demonstrated use of exponents to solve problems.
3. Demonstrated use of logarithms to solve problems.
4. Demonstrated use of common and natural logarithms.

RESULTS:

Demonstrated knowledge of the properties of exponents and logarithms by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.19 Determine slope, midpoint and distance

MEASUREMENT CRITERIA

1. Defined “slope”.
2. Defined “midpoint”.
3. Defined “distance of a point from a line”.
4. Determined the slope of a graph.
5. Determined the slope from an algebraic equation.
6. Determined the midpoint.
7. Determined the distance of a point from a line.

RESULTS:

Demonstrated ability to determine slope, midpoint, and distance by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.20 Graph functions

MEASUREMENT CRITERIA

1. Drew graphs of specified mathematical functions relevant to electronics.

RESULTS:

Demonstrated knowledge of graph functions by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.21 Use Boolean algebra to break down logic circuits

MEASUREMENT CRITERIA

1. Defined Boolean algebra.
2. Used Boolean algebra to describe commonly used logic circuits.

RESULTS:

Demonstrated knowledge of Boolean algebra to break down logic circuits by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.22 Determine perimeters and area of geometric figures

MEASUREMENT CRITERIA

1. Determined the perimeter of various geometric figures.
2. Determined area of various geometric figures.

RESULTS:

Demonstrated ability to determine perimeter and area of geometric figures by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.23 Determine surface areas and volumes of applicable geometric figures

MEASUREMENT CRITERIA

1. Determined surface area of various geometric figures.
2. Determined volume of various geometric figures.

RESULTS:

Demonstrated ability to determine surface areas and volumes by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.24 Recognize, classify and use properties of lines and angles

MEASUREMENT CRITERIA

1. Defined “positive angle”.
2. Defined “negative angle”.
3. Defined “Radian”.
4. Defined “Arc length”.
5. Described the properties of a line.
6. Converted degrees to radians.
7. Converted radians to degrees.
8. Determined size of angle from appropriate information.

RESULTS:

Demonstrated the ability to recognize, classify, and use properties of lines and angles by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.25 Recognize, classify and use properties of two and three-dimensional figures (e.g., circles, triangles, rectangles, cylinders)

MEASUREMENT CRITERIA:

1. Defined "a circle."
2. Defined "a triangle."
3. Defined "a rectangle."
4. Defined various polygons.
5. Defined various cylinders, cubes, and other three-dimensional figures.
6. Performed various calculations related to the use of the properties of the figures.

RESULTS:

Demonstrated the ability to recognize, classify, and use properties of two and three-dimensional figures by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.26 Apply Pythagorean theorem

MEASUREMENT CRITERIA

1. Stated the "Pythagorean theorem".
2. Described and used Pythagorean Theorem to solve various geometric problems.

RESULTS:

Demonstrated knowledge and use of Pythagorean Theorem by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.27 Identify basic functions of sine, cosine, and tangent

MEASUREMENT CRITERIA

1. Defined the "six trigonometric functions".

RESULTS:

Demonstrated knowledge of basic trigonometric functions by the completion of all activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.28 Compute and solve problems using basic trigonometric functions

MEASUREMENT CRITERIA

1. Determined one angle given two sides of a right triangle.
2. Determined the other sides given one side and an angle.
3. Determined one angle given the other two angles.
4. Determined the tangent given the sine and cosine.
5. Determined the trigonometric function of an angle given in radians.
6. Determined the trigonometric function of an angle given in degrees.
7. Determined the height of an object given the distance to the object and the angle of elevation.

RESULTS:

Demonstrated the ability to complete and solve problems using basic trigonometric functions by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

E. Proficiency in Mathematics

Skill: E.29 Graph basic functions using polar and/or Cartesian coordinate system

MEASUREMENT CRITERIA

1. Drew the graph of f(x,y)= 0 using a rectangular Cartesian coordinate system.
2. Drew the graph of f(x,y)= 0 using a polar coordinate system.
3. Drew the graph of the sine function.
4. Drew the graph of the cosine function.
5. Identified the shape of the graph from the equation.

RESULTS:

Demonstrated knowledge of graphing basic functions using polar and cartesian coordinates by the completion of each activity. Appropriate number relations, measurements, analysis and math applications were applied to each activity. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

F. Proficiency in Physics

Skill: F.01 Understand fundamental principles of mechanics

MEASUREMENT CRITERIA

1. Defined inertia.
2. Defined acceleration.
3. Described Newton's laws and some applications.
4. Described the forces acting upon a body.
5. Described the basic characteristics of heat transfer.

RESULTS:

Demonstrated knowledge of the fundamental principles of mechanics by the completion of each activity without error. The activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

F. Proficiency in Physics

Skill: F.02 Understand fundamental principles of pneumatics

MEASUREMENT CRITERIA

1. Described physical properties of gases.
2. Distinguished between various types of compressors, blowers and vacuum pumps.
3. Described isothermal, adiabatic and polytropic compression.
4. Solved pressure, volume and temperature problems for gases.

RESULTS:

Demonstrated knowledge of pneumatics by the completion of each activity with no errors. Accurate measurement, established safety standards and appropriate tools were used to perform each activity. The work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

F. Proficiency in Physics

Skill: F.03 Understand fundamental principles of hydraulics

MEASUREMENT CRITERIA

1. Defined hydraulics and its importance.
2. Defined viscosity and its importance.
3. Defined turbulence and its importance.
4. Described the various principles of fluid motion.

RESULTS:

Demonstrated knowledge of the fundamental principles of hydraulics by the completion of each activity with no errors. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Basic and Practical Skills

F. Proficiency in Physics

Skill: F.04 Understand fundamental principles of electricity including its relationship to the nature of matter

MEASUREMENT CRITERIA

1. Defined electrostatic force.
2. Defined electric charge.
3. Defined impedance.
4. Defined resistance as it applies to electricity.
5. Defined electromagnetism and cited some applications.
6. Defined semiconductors and cited some applications.
7. Defined transistors and cited some applications.
8. Described the wave theory of electricity.
9. Described storage of electricity and cite some applications.
10. Described the basics of currents and why they are essential to describing the interactions among elementary particles.

RESULTS:

Demonstrated knowledge of the principles of electricity including its relationship to the nature of matter by the completion of each activity. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

A. Work Ethics and Behavior

B. Interpersonal Relationships

C. Teamwork

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

A. Work Ethics and Behavior

Skill: A.01 Implement responsibilities of job position including exhibiting dependability and meeting organizationally defined expectations

MEASUREMENT CRITERIA

1. Interpreted job expectation from job manual and job description.
2. Listed the chain of command for dealing with problems.
3. Reported and was ready for work on time.
4. Defined dependability as related to the job description.

RESULTS:

Demonstrated knowledge of the job position, responsibilities and the ability to implement responsibilities of the job position including exhibiting dependability and meeting organizationally defined expectations by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

A. Work Ethics and Behavior

Skill: A.02 Follow rules, regulations and policies as established including interpreting employer/employee handbook and procedures

MEASUREMENT CRITERIA

1. Listed methods/procedures for identifying company rules, regulations and policies.
2. Interpreted and explained the rules, regulations, and policies in an understandable way.
3. Identified reasons why following established company rules, regulations and policies are essential to a safe and efficient work environment.
4. Reviewed examples of employee performance evaluations and discussed how established rules, regulations and policies effect evaluation ratings.

RESULTS:

Demonstrated knowledge of employer rules, regulations and policies and the ability to follow the rules, regulations and policies as established by the employee handbook.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

A. Work Ethics and Behavior

Skill: A.03 Understand and practice cost effectiveness

MEASUREMENT CRITERIA

1. Defined cost effectiveness.
2. Identified the different types of costs incurred by an electronics business.
3. Listed ways that the electronics technician should practice cost effectiveness on the job.
4. Explained ways cost effectiveness practices help the employer, employee, and/or customer(s).

RESULTS:

Demonstrated knowledge of cost effectiveness practices and the ability to identify and implement cost effectiveness practices associated with an electronics technician's job by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

A. Work Ethics and Behavior

Skill: A.04 Practice time management and follow work schedule

MEASUREMENT CRITERIA

1. Explained the importance of time management to the employee and employer.
2. Listed techniques that allow a task to be completed in an efficient manner.
3. Reviewed time management situations electronics technicians encounter on the job and how the situations were handled.
4. Completed a time log and analyzed it to determine the effectiveness of time spent on each task.

RESULTS:

Demonstrated knowledge of time management practices and the ability to maintain established work schedule and initiate time management practices by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

A. Work Ethics and Behavior

Skill: A.05 Assume responsibility for own decisions and actions

MEASUREMENT CRITERIA

1. Explained the positive and negative effects that an action/decision has on the employer, employee or other individuals.
2. Emphasized the importance of the electronics technician accepting responsibility for any action or decision they make.
3. Evaluated a task to determine who should assume the decision making role and identified the action to take.

RESULTS:

Demonstrated knowledge of accepting responsibility and the ability to make decisions related to an electronics technician's job position and assumed responsibility for the actions taken or decisions made.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

A. Work Ethics and Behavior

Skill: A.06 Exhibit pride

MEASUREMENT CRITERIA

1. Defined pride.
2. Identified different types of work pride exhibited by employees and how they benefit the employer.
3. Listed ways to exhibit pride.
4. Explained how pride in the completion of a task reflects on the company.
5. Interpreted consequences of lack of pride.

RESULTS:

Demonstrated knowledge of work pride and displayed pride in the work by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

A. Work Ethics and Behavior

Skill: A.07 Display initiative in undertaking new tasks

MEASUREMENT CRITERIA

1. Explained work situations that provide employees an opportunity to display initiative.
2. Listed ways initiative can be displayed in the completion of a task.
3. Observed others completing a task and listed ways they displayed initiative.
4. Explained the consequences of lack of initiative.

RESULTS:

Demonstrated knowledge of workplace initiative and the ability to display initiative in undertaking new tasks by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

A. Work Ethics and Behavior

Skill: A.08 Show assertiveness appropriate to the situation

MEASUREMENT CRITERIA

1. Explained assertiveness techniques.
2. Interpreted how actions can display both positive and negative assertiveness.
3. Listed situations requiring assertiveness in the work place.
4. Demonstrated assertiveness in the completion of a task.

RESULTS:

Demonstrated knowledge of workplace assertiveness and the ability to utilize proper assertiveness techniques for appropriate situations by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

A. Work Ethics and Behavior

Skill: A.09 Seek work challenges

MEASUREMENT CRITERIA

1. Defined work challenge.
2. Identified work challenges in the electronics technician work area.

RESULTS:

Demonstrated knowledge of work challenges and the ability to identify and successfully seek work challenges in the electronics technician work field.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

A. Work Ethics and Behavior

Skill: A.10 Understand and apply ethical principles to decision making

MEASUREMENT CRITERIA

1. Described ethical reasoning principles and their application to decision making.
2. Described a work situation that required ethical reasoning.
3. Applied ethical reasoning to the completion of a task.

RESULTS:

Demonstrated knowledge of ethical reasoning principles nd the ability to apply ethical principles to work related decisions by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

A. Work Ethics and Behavior

Skill: A.11 Comply with company standards including dress, personal hygiene and cleanliness

MEASUREMENT CRITERIA

1. Identified the dress, hygiene and cleanliness standard outlined in the company manual.
2. Explained the consequences of not complying with company policies.
3. Interpreted the dress, personal hygiene and cleanliness standards as they relate to safety and company image.
4. Described methods for complying with company standards while maintaining personal rights.
5. Planned a wardrobe appropriate for the job performed.

RESULTS:

Demonstrated knowledge of established company standards and the ability to identify, interpret and comply with company standards by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

A. Work Ethics and Behavior

Skill: A.12 Understand the importance of providing good customer service (internal and external)

MEASUREMENT CRITERIA

1. Identified the difference between internal and external customer service.
2. Explained the importance of business image in providing products/or services.
3. Listed ways to provide customers with positive service.
4. Read and interpreted company policy in dealing with customers.
5. Described ethical, social and legal responsibilities of providing good customer service.

RESULTS:

Demonstrated knowledge of customer service practices and the ability to provide good external and internal customer service and establish good customer relations by the completion of each activity.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

B. Interpersonal Relationships

Skill: B.01 Respond constructively to suggestions for improvement

MEASUREMENT CRITERIA

1. Explained the difference between constructive criticism and destructive criticism.
2. Explained the reasons for constructive suggestions for improvement.
3. Identified the benefits of responding constructively to suggestions for improvement.
4. Analyzed a situation and responded to suggestions for improvement.
5. Demonstrated willingness to improve by following suggestions for improvement.

RESULTS:

Demonstrated knowledge of the benefits of constructive criticism and the ability to respond to suggestions for improvement in a positive, constructive manner.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

B. Interpersonal Relationships

Skill: B.02 Provide praise and suggestions for improvement

MEASUREMENT CRITERIA

1. Explained the need for praise and suggestions for improvement in the workplace.
2. Explained the difference between positive and negative suggestions.
3. Listed appropriate times to offer praise and suggestions.
4. Identified methods for providing suggestions in a constructive manner.
5. Explained how voice/tone control and body language are important when providing praise and suggestions for improvement.

RESULTS:

Demonstrated knowledge of methods for providing praise and suggestions for improvement and the ability to provide praise and suggestions in a constructive manner.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

B. Interpersonal Relationships

Skill: B.03 Channel/control emotional reactions constructively

MEASUREMENT CRITERIA

1. Described the effects of emotional reactions to work situations.
2. Explained the importance of controlling emotional reactions.
3. Listed methods for channeling/controlling emotional reactions constructively.
4. Demonstrated emotional control in the completion of tasks.
5. Identified work situations in which electronic technicians would need to channel or control emotions.
6. Analyzed work situations to determine the best method for the electronics technician to constructively channel or control their emotional reactions.

RESULTS:

Demonstrated knowledge of constructive methods for channeling/controlling emotional reactions and the ability to provide emotional reactions in a positive, constructive manner.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

B. Interpersonal Relationships

Skill: B.04 Recognize problems and work toward their solution

MEASUREMENT CRITERIA

1. Explained how a work related problem stems from multiple sources/situations that effect the solution.
2. Explained how one problem has several solutions.
3. Identified methods for effective problem solving on the job.
4. Listed advantages of resolving problems in a cooperative way.

RESULTS:

Demonstrated knowledge of problem solving methods and the ability to identify a problem situation and initiate and an effective solution in a positive, constructive manner. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

B. Interpersonal Relationships

Skill: B.05 Exhibit positive behavior

MEASUREMENT CRITERIA

1. Explained how positive work behavior improves the work environment.
2. Interpreted how worker behavior has positive or negative effects on co-workers.
3. Explained how worker attitudes effect worker performance and safety.
4. Identified methods for effectively exhibiting positive work behavior.
5. Listed ways in which an electronics technician exhibits positive behavior on the job.

RESULTS:

Demonstrated knowledge of the importance of positive behavior and the ability to exhibit positive behavior in different work situations.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

B. Interpersonal Relationships

Skill: B.06 Exhibit sensitivity to internal and external customer needs

MEASUREMENT CRITERIA

1. Defined the difference between internal and external customer needs.
2. Explained how exhibiting sensitivity to customer needs is important to the company and customer relations.
3. Identified situations in which an electronics technician would be required to exhibit sensitivity to customer needs.
4. Listed methods for exhibiting sensitivity to work situations concerning customer needs.

RESULTS:

Demonstrated knowledge of customer needs and the ability to exhibit sensitivity to customer's internal and external needs. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

B. Interpersonal Relationships

Skill: B.07 Treat people with respect

MEASUREMENT CRITERIA

1. Explained the difference between respectful behavior and disrespectful behavior.
2. Listed benefits of respectful behavior in the workplace.
3. Identified work situations in which an electronics technician displays respect.

RESULTS:

Demonstrated knowledge of respectful behavior and the ability to treat people with respect in varying work situations.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

B. Interpersonal Relationships

Skill: B.08 Recognize non-verbal communication

MEASUREMENT CRITERIA

1. Identified types of non-verbal communication encounters on the job.
2. Explained how to recognize non-verbal communication and interpret its meaning.
3. Explained how body language can override verbal communication.

RESULTS:

Demonstrated knowledge and importance of non-verbal communication.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

C. Teamwork

Skill: C.01 Understand interactive relationships required for effective teamwork

MEASUREMENT CRITERIA

1. Identified styles of leadership used in effective teams.
2. Described the roles necessary to perform a team task.
3. Explained the need and importance of communication in effective teamwork situations.
4. Observed teams at work and evaluated the roles of each team member.
5. Listed teamwork situations and roles that are encountered on the job.
6. Emphasized the importance of team members completing responsibilities in a timely and efficient manner.

RESULTS:

Demonstrated knowledge of effective teamwork procedures and the ability to maintain interactive relationships necessary for effective teamwork.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

C. Teamwork

Skill: C.02 Understand team's operating procedures

MEASUREMENT CRITERIA

1. Specified the advantages for using teamwork to complete a task.
2. Pointed out different methods/procedures for operating a team.
3. Identified team member roles required to operate effectively as a team.
4. Emphasized the importance of all team members completing assigned responsibilities.
5. Explained reasons why working as a team is beneficial.
6. Listed situations in which employees would be involved as part of a team.

RESULTS:

Demonstrated knowledge of team operational procedures and the ability to function successfully as part of a team. All activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

C. Teamwork

Skill: C.03 Adapt as necessary to complete the team task

MEASUREMENT CRITERIA

1. Described how team roles can overlap and situations that require a redistribution of team responsibilities.
2. Explained the importance of maintaining deadlines to ensure the whole team's success.
3. Explained the "shared efforts leads to shared rewards" concept.
4. Identified situations that require adaptation by a team to ensure the team's success.

RESULTS:

Demonstrated knowledge of teamwork procedures and the ability to identify the need for procedural adaptation and institute team changes necessary for successful team task completion.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Desirable Behavior and Work Habits

C. Teamwork

Skill: C.04 Evaluate outcome

MEASUREMENT CRITERIA

1. Explained the need for comparing desired project goals to the project's outcome to evaluate the success of a team project and as a reference for future projects.
2. Identified methods for evaluating the outcome of a team project.
3. Analyzed team project goals and outcomes to establish the success or failure of the project.

RESULTS:

Demonstrated knowledge of the procedures for evaluating team's project outcomes and the ability to determine if the outcome fulfilled the desired team project goals. All activities were completed in a reasonable time frame.

TEST EQUIPMENT AND TOOLS

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.01 Breakout Box

MEASUREMENT CRITERIA:

1. Described the function and use of the breakout box, with examples of appropriate situations for its use.
2. Demonstrated ability to use a breakout box.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a breakout box using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.02 Calibration Standards

MEASUREMENT CRITERIA:

1. Be aware of the existence of calibration standards.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of calibration standards using necessary safety procedures within a reasonable time frame.

QUESTION FOR TECHNICAL COMMITTEE:

1. Be aware of the existence of calibration requirements for test equipment and tools.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of calibration requirements.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.03 Capacitor/Inductor Analyzer

MEASUREMENT CRITERIA:

1. Described the function and use of the capacitor/inductor analyzer, with examples of appropriate situations for its use.
2. Demonstrated ability to use a capacitor/inductor analyzer.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a capacitor/inductor analyzer using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.04 Current Probe

MEASUREMENT CRITERIA:

1. Described the function and use of the current probe, with examples of appropriate situations for its use.
2. Demonstrated ability to use a current probe.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a current probe using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.05 DC Power Source

MEASUREMENT CRITERIA:

1. Described the function and use of the DC power source, with examples of appropriate situations for its use.
2. Demonstrated ability to use a DC power source.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a DC power source using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.06 Digital Storage Oscilloscope

MEASUREMENT CRITERIA:

1. Described the function and use of the digital storage oscilloscope, with examples of appropriate situations for its use.
2. Demonstrated ability to use a digital storage oscilloscope.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a digital storage oscilloscope using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.07 Dummy Load

MEASUREMENT CRITERIA:

1. Described the function and use of the dummy load, with examples of appropriate situations for its use.
2. Demonstrated ability to use a dummy load.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a dummy load using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.08 Electrical Field Strength Meter

MEASUREMENT CRITERIA:

1. Described the function and use of the electrical field strength meter, with examples of appropriate situations for its use.
2. Demonstrated ability to use an electrical field strength meter.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of an electrical field strength meter using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.09 Electrical Resistance Insulation Tester

MEASUREMENT CRITERIA:

1. Described the function and use of an electrical resistance insulation tester, with examples of appropriate situations for its use.
2. Demonstrated ability to use an electrical resistance insulation tester.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of an electrical resistance insulation tester using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.10 Electrostatic Discharge Meter (ESD)

MEASUREMENT CRITERIA:

1. Described the function and use of an electrostatic discharge meter (ESD), with examples of appropriate situations for its use.
2. Applied all necessary safety procedures.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of an electrostatic discharge meter (ESD) using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.11 Frequency Counter

MEASUREMENT CRITERIA:

1. Described the function and use of the frequency counter, with examples of appropriate situations for its use.
2. Demonstrated ability to use a frequency counter.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a frequency counter using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.12 Function Generator

MEASUREMENT CRITERIA:

1. Described the function and use of the function generator, with examples of appropriate situations for its use.
2. Demonstrated ability to use a function generator.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a function generator using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.13 Ground Fault Testers

MEASUREMENT CRITERIA:

1. Described the function and use of the ground fault tester, with examples of appropriate situations for its use.
2. Applied all necessary safety procedures.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a ground fault tester using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.14 Hand Tools

MEASUREMENT CRITERIA:

1. Described the function and use of hand tools, with examples of appropriate situations for its use.
2. Demonstrated ability to use hand tools.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of hand tools using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.15 High Potential Testers

MEASUREMENT CRITERIA:

1. Described the function and use of the high potential tester, with examples of appropriate situations for its use.
2. Demonstrated ability to use high potential testers.
3. Applied all necessary safety procedures.
4. Demonstrated correct set up procedures
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a high potential tester using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.16 Isolation Transformer

MEASUREMENT CRITERIA:

1. Described the function and use of the isolation transformer, with examples of appropriate situations for its use.
2. Demonstrated ability to use an isolation transformer.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of an isolation transformer using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.17 LASER Power Meter

MEASUREMENT CRITERIA:

1. Described the function and use of the LASER power meter, with examples of appropriate situations for its use.
2. Applied all necessary safety procedures.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a LASER power meter using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.18 Light Intensity Meter

MEASUREMENT CRITERIA:

1. Described the function and use of the light intensity meter, with examples of appropriate situations for its use.
2. Applied all necessary safety procedures.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a light intensity meter using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.19 Logic Analyzer

MEASUREMENT CRITERIA:

1. Described the function and use of the logic analyzer, with examples of appropriate situations for its use.
2. Demonstrated ability to use a logic analyzer.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a logic analyzer using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.20 Logic Probe

MEASUREMENT CRITERIA:

1. Described the function and use of the logic probe, with examples of appropriate situations for its use.
2. Demonstrated ability to use a logic probe.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a logic probe using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.21 Logic Pulser

MEASUREMENT CRITERIA:

1. Described the function and use of the logic pulser, with examples of appropriate situations for its use.
2. Demonstrated ability to use a logic pulser.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a logic pulser using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.22 Multimeters (Digital and Analog)

MEASUREMENT CRITERIA:

1. Described the function and use of the multimeter (digital and analog), with examples of appropriate situations for its use.
2. Demonstrated ability to use a multimeter (digital and analog).
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a multimeter (digital and analog) using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.23 Oscilloscope

MEASUREMENT CRITERIA:

1. Described the function and use of the oscilloscope, with examples of appropriate situations for its use.
2. Demonstrated ability to use an oscilloscope.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of an oscilloscope using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.24 Power Tools

MEASUREMENT CRITERIA:

1. Described the function and use of power tools, with examples of appropriate situations for its use.
2. Demonstrated ability to use power tools.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of power tools using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.25 Pressure Gauges

MEASUREMENT CRITERIA:

1. Described the function and use of pressure gauges, with examples of appropriate situations for its use.
2. Demonstrated ability to use pressure gauges.
3. Applied all necessary safety procedures.
4. Demonstrated correct set up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of pressure gauges using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.26 RF Power Meter

MEASUREMENT CRITERIA:

1. Described the function and use of the RF power meter, with examples of appropriate situations for its use.
2. Demonstrated ability to use an RF power meter.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of an RF power meter using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.27 RF Signal Generator

MEASUREMENT CRITERIA:

1. Described the function and use of the RF signal generator, with examples of appropriate situations for its use.
2. Demonstrated ability to use an RF signal generator.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of an RF signal generator using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.28 Semiconductor Tester

MEASUREMENT CRITERIA:

1. Described the function and use of a semiconductor tester, with examples of appropriate situations for its use.
2. Applied all necessary safety procedures.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a semiconductor tester using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.29 Soldering/Desoldering Equipment and Supplies

MEASUREMENT CRITERIA:

1. Described the function and use of soldering/desoldering equipment and supplies, with examples of appropriate situations for its use.
2. Demonstrated ability to use soldering/desoldering equipment and supplies.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of soldering/desoldering equipment and supplies using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.30 Soldering/Desoldering Equipment and Supplies for Surface Mount Devices (SMD)

MEASUREMENT CRITERIA:

1. Described the function and use of soldering/desoldering equipment and supplies for surface mount devices (SMD), with examples of appropriate situations for its use.
2. Demonstrated ability to use soldering/desoldering equipment and supplies for surface mount devices (SMD).
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of soldering/desoldering equipment and supplies for surface mount devices (SMD) using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.31 Spectrum Analyzer

MEASUREMENT CRITERIA:

1. Described the function and use of the spectrum analyzer, with examples of appropriate situations for its use.
2. Demonstrated ability to use a spectrum analyzer.
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a spectrum analyzer using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.32 Temperature Transducer

MEASUREMENT CRITERIA:

1. Described the function and use of the temperature transducer, with examples of appropriate situations for its use.
2. Demonstrated ability to use temperature transducers.
3. Applied all necessary safety procedures.
4. Demonstrated correct set up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a temperature transducer using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.33 Torque Measuring Tools

MEASUREMENT CRITERIA:

1. Be aware of the existence of torque measuring tools.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of torque measuring tools using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.34 Vacuum Gauges

MEASUREMENT CRITERIA:

1. Described the function and use of vacuum gauges, with examples of appropriate situations for its use.
2. Demonstrated ability to use vacuum gauges.
3. Applied all necessary safety procedures.
4. Demonstrated correct set up procedures.
5. Recorded results of equipment use.
6. Interpreted results of testing.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of vacuum gauges using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Test Equipment and Tools

Skill: TE.35 Voltage Isolation Transformer (Adjustable)

MEASUREMENT CRITERIA:

1. Described the function and use of the voltage isolation transformer (adjustable), with examples of appropriate situations for its use.
2. Demonstrated ability to use a voltage isolation transformer (adjustable).
3. Applied all necessary safety procedures.
4. Demonstrated correct set-up procedures.

RESULTS:

Demonstrated knowledge of the appropriate and correct use of a voltage isolation transformer (adjustable) using necessary safety procedures within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

A. General
B. DC Circuits
C. AC Circuits
D. Discrete Solid State Devices
E. Analog Circuits
F. Digital Circuits
G. Microprocessors
H. Microcomputers

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

A. General

Skill: A.01 Demonstrate an understanding of proper safety techniques for all types of circuits and components (DC circuits, AC circuits, analog circuits, digital circuits, discrete solid-state circuits, microprocessors)

MEASUREMENT CRITERIA

1. Showed an awareness of safety by performing activities according to established safety procedures.

   A. Followed guidelines for personal protection equipment:

      1. Head protection
      2. Hearing protection
      3. Face and eye protection
      4. Footwear
      5. Special work clothing

   B. Assumed responsibility for carrying out safety rules regarding:

      1. Hazardous materials
      2. Hazardous locations
      3. Mechanical safety
      4. Electrical safety
      5. Environmental safety
      6. Thermal safety
      7. Radiation safety
      8. Laser safety

   C. Protection of circuits and devices

      1. ESD Protection
      2. Packaging and handling
      3. Heat and environment

RESULTS:

Demonstrated knowledge of safety techniques by the completion of activities using established safety procedures. Safety was primary in the operation of hand tools, motors, amplifiers, and equipment.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

A. General

Skill: A.02 Demonstrate an understanding of and comply with relevant OSHA safety standards

MEASUREMENT CRITERIA

1. Referenced OSHA standards necessary to complete each step of a task.

2. Applied OSHA safety standards as necessary in the following areas:

    a. Personal safety
    b. Hazardous materials (Material Safety Data Sheet (MSDS)
    c. Hazardous locations
    d. Mechanical safety
    e. Electrical safety
    f. Environmental safety
    g. Thermal safety
    h. Radiation safety
    i. Laser safety

RESULTS:

Demonstrated knowledge of necessary safety techniques by the completion of activities using established safety procedures. These procedures provided personal, environmental, and product safety.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

A. General

Skill: A.03 Demonstrate an understanding of proper troubleshooting techniques

MEASUREMENT CRITERIA

1. Demonstrated proficiency in troubleshooting by identifying the operations and functions of:
    - a. Assembly level
    - b. Board level
    - c. Component level
2. Identified faults of circuits by interpreting:
    - a. Diagnostic flowcharts
    - b. Troubleshooting charts
    - c. Schematics
    - d. Upgrade in modification notices
3. Identified faults by:
    - a. Analyzed symptoms
    - b. Applied appropriate procedures
    - c. Applied manual specifications
    - d. Determined test equipment needs
    - e. Tested to requirements

RESULTS:

Demonstrated knowledge of proper troubleshooting techniques by the identification of circuit faults and by repairing the circuit. Activities were completed within a reasonable time frame. Necessary tools, equipment, and safety procedures were used. Proper circuit laws were used and calculations were correct.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

A. General

Skill: A.04 Demonstrate an understanding of basic assembly skills using hand and power tools

MEASUREMENT CRITERIA

1. Identified the tools to complete basic electronics tasks.
2. Explained and demonstrated the proper use of each tool:
   a. Hand
   b. Power
3. Applied approved safety procedures to the use of each tool.
4. Stored tools at the completion of the task.

RESULTS:

Demonstrated knowledge of basic assembly skills using hand and power tools by completion of each activity with no safety errors. Accepted fabrication and measurement practices were followed. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

A. General

Skill: A.05 Demonstrate an understanding of acceptable soldering/desoldering techniques, including through-hole and surface mount devices

MEASUREMENT CRITERIA

1. Described solder type and flux for electronic applications.
2. Identified solder joint type:
    a. Cold
    b. Over
    c. Under
    d. Proper
3. Described various methods for solder removal.
4. Demonstrated the ability to solder and desolder including through-hole and surface mount situations.

RESULTS:

Demonstrated knowledge of acceptable soldering and desoldering techniques by the completion of a circuit(s) that was functioning to specification. Necessary tools, equipment and safety procedures were used. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

A. General

Skill: A.06 Demonstrate an understanding of proper solderless connections

MEASUREMENT CRITERIA

1. Explained the steps to follow to complete a solderless connection.
2. Selected the appropriate connectors.
3. Checked connectivity of solderless connection.

RESULTS:

Demonstrated knowledge of solderless connections by the completion of each activity. Accepted safety, fabrication and measurement practices were followed. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

A. General

Skill: A.07 Demonstrate an understanding of the use of data books and cross reference/technical manuals to specify and requisition electronic components

MEASUREMENT CRITERIA

1. Identified components for the fabrication and repair of circuits using:

    a. Schematic
    b. Diagnostic flow charts
    c. Troubleshooting charts
    d. Upgrades and modification notices
    e. Manual specifications

2. Completed request for parts and other necessary materials for fabrication and repair of circuits and components.

RESULTS:

Demonstrated knowledge of the use of data books and cross reference/technical manuals by the completion of the task with the necessary components and materials.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

A. General

Skill: A.08 Demonstrate an understanding of the interpretation and creation of electronic schematics, technical drawings and flow diagrams

MEASUREMENT CRITERIA

1. Interpreted:
    a. Diagnostic flowcharts
    b. Troubleshooting charts
    c. Schematics
        1) Symbols
        2) Drew and labeled a schematic of a circuit board
        3) Traced a signal
        4) Identified system block
        5) Constructed equipment
2. Diagrammed:
    a. Schematic
    b. Wiring diagrams
    c. Block diagrams
    d. Logic
    e. Multipage system
3. Explained various views from blueprint.

RESULTS:

Demonstrated knowledge of circuits by the ability to interpret electronic schematics, technical drawings and flow diagrams to construct and/or repair a circuit. Work was completed within a reasonable time frame.

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Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

A. General

Skill: A.09 Demonstrate an understanding of design curves, table, graphs, and recording of data

MEASUREMENT CRITERIA

1. Graphed a design curve which illustrated the relationship between two variables to show the characteristics of the circuit.
2. Recorded data in a clear and concise manner.
3. Read and explained tables, curves and graphs.
4. Diagnosed an electronics problem with the aid of design curves, tables, graphs and other data.

RESULTS:

Demonstrated knowledge of design curves, tables, graphs and recording of data by the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

A. General

Skill: A.10 Demonstrate an understanding of color codes and other component descriptors

MEASUREMENT CRITERIA

1. Named colors representing different component values.
2. Identified a component value by its color code.
3. Identified color representations for power leads.
4. Recognized and interpreted components by shape and size.

RESULTS:

Demonstrated knowledge of color codes and other component descriptors by the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

A. General

Skill: A.11 Demonstrate an understanding of site electrical and environmental survey

MEASUREMENT CRITERIA

1. Identified safety hazards at the work site.
2. Identified signs to alert for danger.
3. Identified potential sources of environmental or electrical/electronic interference in placement of equipment.

RESULTS:

Demonstrated knowledge of the work site electrical and environmental situation. Recorded data collected from electrical and environmental surveys.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

A. General

Skill: A.12 Demonstrate the use of listening skills or assistive devices to assess signs and symptoms of malfunctions

MEASUREMENT CRITERIA

1. Activated all applicable electronic device functions needed to initiate each auditory cue.
2. Compared results of auditory cues initiated as specified in electronic device manufacturers specifications.
3. Performed diagnostic routine and conducted performance test until auditory cue is restored as specified.

RESULTS:

Demonstrated knowledge of listening skills or assistive devices to assess signs or symptoms of malfunctions by the completion of each activity. Accepted safety, fabrication and measurement practices were followed. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.01 Demonstrate an understanding of sources of electricity in DC circuits

MEASUREMENT CRITERIA

1. Explained the functions and parts of major sources of DC current.
2. Explained the production of electricity utilizing:
    a. Magnetism
    b. Pressure
    c. Heat
    d. Light
    e. Chemical
    f. AC conversion

RESULTS:

Demonstrated knowledge of the sources of electricity by the production of current with various energy sources. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.02 Demonstrate an understanding of principles and operation of batteries

MEASUREMENT CRITERIA

1. Explained and identified battery types including:
   - a. Voltage cells
   - b. Carbon zinc cells
   - c. Alkaline cells
   - d. Dry cells
   - e. Lithium cells
   - f. Lead-acid cells
   - g. Secondary cells
   - h. Nickel-hydroxide
   - i. Nickel-cadmium

RESULTS:

Demonstrated knowledge of batteries by the identification and explanation of the function and operation of batteries. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.03 Demonstrate an understanding of the meaning of and relationships among and between voltage, current resistance and power in DC

MEASUREMENT CRITERIA

1. Defined voltage.
2. Defined current.
3. Defined resistance.
4. Defined energy.
5. Defined power.

RESULTS:

Demonstrated knowledge of voltage, current, resistance, and power and energy by the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.04 Demonstrate an understanding of the measurement of resistance of conductors and insulators and the computation of conductance

MEASUREMENT CRITERIA

1. Described the relationship between diameter of a conductor and resistance.
2. Matched wire size(diameter) and wire gauge(AWG) and explained their use.
3. Illustrated examples of good insulators and good conductors.
4. Described the relationships of resistance to conductors.
5. Gave reasons for the use of switches and safety devices in electrical circuits.

RESULTS:

Demonstrated knowledge of resistance of conductors and insulators by the completion of each activity. Necessary tools, equipment, and safety procedures were used. Proper circuit laws were used and calculations were correct. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.05 Demonstrate an understanding of application of Ohm's Law to series, parallel and series-parallel circuits

MEASUREMENT CRITERIA

1. Explained how resistance, current and voltages are related in an electric circuit.
2. Applied equations to solve problems using Ohm's laws.
3. Applied equations to solve problems using power formula (Watt's Law).
4. Applied Kirchhoff's current law.
5. Applied Kirchhoff's voltage law.

RESULTS:

Demonstrated knowledge of Ohm's Law, as it relates to series parallel and series-parallel circuits, by the completion of each activity. Proper circuit laws were used and calculations were correct. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.06 Demonstrate an understanding of magnetic properties of circuits and devices

MEASUREMENT CRITERIA

1. Identified natural and artificial magnets grouping them into permanent and temporary types.
2. Explained magnetic domains and their effects on magnetic fields.
3. Summarized the relationship between electrical current and magnetism and solenoid concentration of a magnetic field.
4. Explained how permeability relates to:
    - a. Magnetomotive force
    - b. Magnetic flux
    - c. Flux density

RESULTS:

Demonstrated knowledge of magnetic properties by the completion of each activity. Proper circuit laws were used and calculations were correct. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.07 Demonstrate an understanding of the physical, electrical, characteristics of capacitors and inductors

MEASUREMENT CRITERIA

1. Described the physical characteristics of capacitors and inductors.
2. Explained procedure to measure capacitance and inductance.

RESULTS:

Demonstrated knowledge of the physical and electrical characteristics of capacitors and inductors by the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.08 Understand principles and operations of DC series circuits

MEASUREMENT CRITERIA

1. Diagrammed and described the operation and function of a DC series circuit in terms of voltage, current, power, and resistance relationships.
2. Calculated the parameters of the DC series circuit.
3. Listed circuits which generally make use of DC series circuits.

RESULTS:

Demonstrated knowledge of the operations and principles of DC series circuits by the completion of each activity. Accepted safety, fabrication and measurement practices were followed. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.09 Fabricate and demonstrate DC series circuits

MEASUREMENT CRITERIA

1. Built series circuit(s) to specification(s).
2. Calculated the parameters of the series circuit(s):
   - a. current
   - b. resistance(s)
   - c. power
   - d. voltage(s)
3. Measured the parameters of the series circuit(s).
   - a. current
   - b. resistance(s)
   - c. voltage(s)
4. Explained the series circuit operation.
5. Demonstrated the successful operation of the circuit(s).

RESULTS:

Demonstrated knowledge of and ability to fabricate series circuits by successfully completing each activity. Acceptable safety, fabrication and measurement procedures were followed. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.10 Troubleshoot and repair DC series circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing circuit(s) operation with specification(s).
2. Calculated values such as resistance, voltage, current, and power.
3. Analyzed circuit(s) to locate fault(s).
4. Repaired DC series circuit(s) to specification(s).
5. Explained the procedure and reason(s) for the action(s) taken.

RESULTS:

Circuit problem was correctly identified within time limits using acceptable equipment and troubleshooting procedures. Repair(s) was accomplished and correct circuit operations demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.11 Understand principles and operations of DC parallel circuits

MEASUREMENT CRITERIA

1. Diagrammed and described a DC parallel circuit.
2. Calculated the parameters of a DC parallel circuit.
3. Listed circuits which generally make use of DC parallel circuits.

RESULTS:

Demonstrated knowledge of the principles and operations of DC parallel circuits by the completion of each activity. Work was completed within a reasonable time frame.

* QUESTIONED NEED FOR STATEMENT 4 - JUST TOO BROAD.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.12 Fabricate and demonstrate the DC parallel circuits

MEASUREMENT CRITERIA

1. Built parallel circuit(s) to specification(s).

2. Calculated circuit(s) parameters:

    a. Current(s).
    b. Resistance(s).
    c. Power.
    d. Voltage(s).

3. Measured:

    a. Current(s).
    b. Resistance(s).
    c. Voltage(s).

4. Explained reasons for circuit operation and how the anticipated results were determined.

5. Demonstrated successful operation of the circuit(s).

RESULTS:

Demonstrated knowledge of and ability to fabricate parallel circuits by the successful completion of each activity. Accepted safety, fabrication, and measurement procedures were followed. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.13 Troubleshoot and repair parallel circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing circuit(s) operation with specification(s).
2. Calculated values such as resistance(s), voltage(s), current(s), and power.
3. Analyzed circuit(s) to locate fault(s).
4. Repaired the parallel circuit(s) to specification(s).
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problem was correctly identified within time limits using acceptable equipment and troubleshooting procedures. Repair(s) was accomplished and correct circuit operations demonstrated. All activities are performed using accepted safety, fabrication, and measurement practices.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.14 Understand the principles and operations of DC series-parallel and bridge circuits

MEASUREMENT CRITERIA

1. Described DC series-parallel and bridge circuits and listed applications for this circuit.
2. Calculated values such as current, power, resistance and voltage.
3. Listed types of bridge circuits and described function of each.

RESULTS:

Demonstrated knowledge of the principles and operations of DC series-parallel and bridge circuits by the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.15 Fabricate and demonstrate DC series-parallel and bridge circuits

MEASUREMENT CRITERIA

1. Built series-parallel and bridge circuits to specification.

2. Calculated values such as:

   a. Resistance(s).
   b. Voltage(s) and current(s).
   c. Power.

3. Measured values such as resistance, current, and voltage.

4. Explained reasons for circuit operation and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of ability to fabricate series-parallel and bridge circuits by the completion of each activity. Accepted safety, fabrication, and measurement procedures were followed. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.16 Troubleshoot and repair series-parallel and bridge circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing circuit(s) operation with specifications.
2. Calculated resistance, voltage, and current distributions as required.
3. Analyzed circuits to locate fault(s).
4. Repaired series-parallel and bridge circuits to specifications.
5. Explained the procedure(s) and reasons for the action(s) taken.

RESULTS:

Problems of series-parallel and bridge circuits were correctly identified within time limits using acceptable equipment and troubleshooting procedures. Repair(s) was accomplished and correct circuit operation demonstrated. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.17 Understand the principles and operations of Wheatstone Bridge

MEASUREMENT CRITERIA

1. Described the operation of the Wheatstone Bridge.
2. Calculated parameters of a Wheatstone Bridge.
3. Listed situations where a Wheatstone Bridge would be used.

RESULTS:

Demonstrated knowledge of the principles and operations of Wheatstone Bridge. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.18 Understand the principles and operations of DC voltage divider circuits (loaded and unloaded)

MEASUREMENT CRITERIA

1. a. Described the characteristics of loaded or unloaded voltage divider circuits.

   b. Interpreted schematic showing DC voltage divider circuits in terms of current,resistance, voltage, and power.

2. Calculated the parameters for the loaded and unloaded voltage divider circuits.

3. Listed applications for the DC voltage divider circuit.

RESULTS:

Demonstrated knowledge of the principles and operation of DC voltage divider circuits (loaded and unloaded) by the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.19 Fabricate and demonstrate the DC voltage divider circuits (loaded and unloaded)

MEASUREMENT CRITERIA

1. Built voltage divider circuit(s) to specification.
2. Calculated circuit parameters as required.
3. Measured parameters to demonstrate correct circuit operation.
4. Explained circuits operation to show performance to meet specifications under loaded and unloaded conditions.

RESULTS:

Demonstrated knowledge of and ability to fabricate voltage divider circuits by the completion of each activity. Accepted safety, fabrication, and measurement practices were followed. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.20 Troubleshoot and repair DC voltage divider circuits (loaded and unloaded)

MEASUREMENT CRITERIA

1. Determined symptoms by comparing circuit(s) operation with specification(s).
2. Calculated resistance(s), voltage(s), and current(s) as required.
3. Analyzed circuit(s) to locate fault(s).
4. Repaired DC voltage divider and bridge circuit(s) to specifications.
5. Explained the procedure(s) and reasons for the action(s) taken.

RESULTS:

Problems of voltage divider circuits were correctly identified within time limits using acceptable equipment and troubleshooting procedures. Repair(s) was accomplished and correct circuit operations demonstrated. Activities were performed using accepted safety, fabrication, and measurement practices.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.21 Understand principles and operations of DC RC and RL circuits

MEASUREMENT CRITERIA

1. a. Described the operation of RC and RL circuits.

   b. Diagrammed a RC and RL circuit.

   c. Described situations where RL and RC circuits are useful.

   d. Described the voltage transients produced in RL circuits.

   e. Described the current transients produced in RC circuits.

   f. Described the universal time constant curve application to the study of RC and RL time constant circuits.

2. a. Calculated for RC and RL circuits:

      a. Time constants for RC and RL circuits.
      b. Charge/discharge times for RC and RL circuits.
      c. Effects of R and C and L on charging/discharging time(s).

   b. Calculated and graphed:

      a. Charging voltage/current as appropriate based on time constants.
      b. Charging times based on voltage/current amplitude as appropriate.

RESULTS:

Demonstrated knowledge of the principles and operation of RC and RL circuits by the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.22 Fabricate and demonstrate DC RC and RL circuits

MEASUREMENT CRITERIA

1. Built RC and RL circuits to specification.
2. Calculated the parameters for RC and RL circuits.
3. Measured and graphed:
    a. Charging voltages based on time constants.
    b. Charging times based on voltage amplitude.
4. Explained the reasons for circuit operation and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate RC and RL circuits by the completion of each activity. Accepted safety, fabrication, and measurement practices were followed. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.23 Troubleshoot and repair DC RC and RL circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing circuit(s) operation with specifications.
2. Calculated power, resistance, voltage, and current distribution as necessary.
3. Analyzed circuits to locate fault(s).
4. Repaired RC and RL circuits to specification.
5. Explained the procedures and reasons for the actions taken.

RESULTS:

Problems of RC and RL circuits were correctly identified within time limits using acceptable equipment and troubleshooting procedures. Repair(s) was accomplished and correct circuit operations demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

B. DC Circuits

Skill: B.24 Demonstrate an understanding of measurement of power in DC circuits

MEASUREMENT CRITERIA

1. Defined power as applied to DC circuits.
2. Calculated power from Ohm's law.
3. Expressed power as wattage.
4. Listed applications of power in DC circuits.

RESULTS:

Demonstrated knowledge of the measurement of power in DC circuits by the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.01 Demonstrate an understanding of sources of electricity in AC circuits

MEASUREMENT CRITERIA

1. Explained the functions and parts of major sources of AC current.
2. Explained the production of electricity utilizing:
    - a. Magnetism
    - b. DC to AC converters

RESULTS:

Demonstrated knowledge of the sources of electricity in AC circuits by the completion of each activity. Activities were completed within a reasonable time.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.02 Demonstrate an understanding of the properties of an AC signal

MEASUREMENT CRITERIA

1. Defined AC signal.
2. Described the flow of alternating current.
3. Explained the properties of an AC signal.

RESULTS:

Demonstrated knowledge of the properties of an AC signal by the completion of each activity. The activities were completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.03 Demonstrate an understanding of the principles of operation and characteristics of sinusoidal and non-sinusoidal wave forms

MEASUREMENT CRITERIA

1. Described the characteristics of sinusoidal and non-sinusoidal wave forms.
2. Displayed and measured characteristics of sinusoidal and non-sinusoidal wave forms on an oscilloscope.
3. Listed applications of sinusoidal and nonsinusoidal wave forms.

RESULTS:

Demonstrated knowledge of the principles of operation of sinusoidal and non-sinusoidal wave forms. Each activity was completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.04 Demonstrate an understanding of basic motor/generator theory and operation

MEASUREMENT CRITERIA

1. Described the motor/generator theory.
2. Described applications of motor/generator theory in design, testing, and troubleshooting.

RESULTS:

Demonstrated knowledge of basic motor/generator theory and operation by the completion of each activity in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.05 Demonstrate an understanding of measurement of power in AC circuits

MEASUREMENT CRITERIA

1. Described the different powers as applied to AC circuits
    a. resistive
    b. reactive
    c. apparent (total)
2. Measured AC signal at selected locations.
3. Interpreted results in terms of frequency and amplitude as necessary.
4. Calculated power levels when necessary.

RESULTS:

Demonstrated knowledge of the measurement of power in AC circuits by the completion of each activity. Accepted tools, safety procedures and measurement were followed. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.06 Demonstrate an understanding of the principle and operation of various power conditioning: (isolation transformers, surge suppressors, uninterruptable power systems)

MEASUREMENT CRITERIA

1. a. Described the principles of power conditioning to smooth out voltage output.
   b. Reviewed electrical principles associated with various power conditioning.
   c. Explained the purpose of switching power supplies and noise filters.
   d. Identified the needs and usage of high speed switching and delivery of regulated power from a power source.
2. Provided examples of different types of power conditioning equipment and how they are used.

RESULTS:

Demonstrated knowledge of various power conditioning operations and the ability to identify types of power conditioning equipment and their associated functions.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits***

Skill: C.07 Demonstrate an understanding of the principle and operation of safety grounding systems: (lightning arresters, ground fault interrupters, etc.)

MEASUREMENT CRITERIA

1. Explained safety grounding systems(lightning arresters, ground fault interrupters, etc.).
2. Diagrammed safety grounding systems.
3. Explained how the grounding system affects equipment operation.

RESULTS:

Demonstrated knowledge of the principle and operation of safety grounding systems by the completion of each activity. All activities were completed in a reasonable time frame.

FUTURE ISSUE:
*** Comment that this skill belongs under DC circuits.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.08 Understand principles and operations of AC capacitive circuits

MEASUREMENT CRITERIA

1. Described the functioning of capacitive circuits (series, parallel, series-parallel).
2. Calculated capacitive reactance of capacitive circuit(s).
3. Explained voltage and current phase relationship in a capacitor.

RESULTS:

Demonstrated knowledge of AC capacitive circuits by the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.09 Fabricate and demonstrate AC capacitive circuits

MEASUREMENT CRITERIA

1. Built series, parallel, series-parallel types of capacitive circuits to specifications
2. a. Calculated circuit characteristics at identified circuit locations.
   b. Graphed the relationship between capacitive reactance and frequency.
   c. Interpreted the phase relationship between voltage and current in the capacitive circuit(s).
3. Made measurements to show circuit operates consistent with calculations.
4. Explained circuit operation and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate AC capacitive circuits by the completion of each activity. Accepted safety, fabrication, and measurement practices were followed. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.10 Troubleshoot and repair AC capacitive circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing circuit operations with specifications.
2. Calculated: Capacitive reactance, voltage, current and power
3. Analyzed circuits to locate fault(s).
4. Repaired capacitive circuit.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Problems of the AC capacitive circuit were identified within time limits using acceptable equipment and troubleshooting procedures. Repairs were accomplished and correct circuit operation demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.11 Understand principles and operations of AC inductive circuits

MEASUREMENT CRITERIA

1. Described the functioning of inductive circuits (series, parallel, series-parallel).
2. Calculated inductive reactance of inductive circuit(s).
3. Explained voltage and current phase relationship in an inductor.

RESULTS:

Demonstrated knowledge of the principles and operation of AC inductive circuits by the completion of each activity. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.12 Fabricate and demonstrate AC inductive circuits

MEASUREMENT CRITERIA

1. Built series, parallel, series-parallel types of inductive circuits to specifications.
2. a. Calculated circuit characteristics at identified circuit locations.
    b. Graphed the relationship between inductive reactance and frequency.
    c. Interpreted the phase relationship between voltage and current in a inductive circuit.
3. Made measurements to show circuit operates consistent with calculations.
4. Explained circuit operation and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate AC inductive circuits through the completion of each activity. A circuit which performed to specifications was the final result. Necessary tools, equipment and required safety procedures were used. Proper circuit laws were used and calculations were correct. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.13 Troubleshoot and repair AC inductive circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing circuit operations with specifications.
2. Calculated:

   Inductive reactance, voltage, current and power
3. Analyzed circuits to locate fault(s).
4. Repaired inductive circuit.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Problems of the AC inductive circuit were identified within time limits using acceptable equipment and troubleshooting procedures. Repairs were accomplished and correct circuit operation demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.14 Understand principles and operations of AC circuits using transformers

MEASUREMENT CRITERIA

1. a. Described the characteristics of transformers in:
   - i. Power
   - ii. Audio
   - iii. Radio Frequency

   b. Created diagrams showing the principle of operation of transformers.

   c. Explained the principles of inductance and mutual inductance.

   d. Described the different types of core.

2. Calculated turns ratio for:
   - a. Current
   - b. Voltage
   - c. Impedance

3. Listed applications of transformers.

RESULTS:

Demonstrated knowledge of the principles of AC circuits using transformers by the completion of each activity. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.15 Demonstrate an understanding of impedance matching theory

MEASUREMENT CRITERIA

1. a. Described the theory of impedance matching.

   b. Explained the importance of impedance matching.

   c. Described the result of poorly matched impedances.

2. Calculated impedance for impedance matching.

3. Listed applications for impedance matching.

RESULTS:

Demonstrated knowledge of impedance matching by the completion of each activity. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.16 Fabricate and demonstrate AC circuits using transformers

MEASUREMENT CRITERIA

1. Built circuit(s) to specification(s) using transformer(s).
2. Calculated circuit characteristics at identified circuit locations.
3. Made measurements to show circuit operates consistent with calculations.
4. Interpreted the phase relationship between voltage and current in a transformer circuit.
5. Explained circuit operation and how the anticipated results were determined.
6. Explained losses.

RESULTS:

Demonstrated knowledge of and ability to fabricate AC circuits utilizing transformers by the completion of each activity. Accepted safety, fabrication, and measurement practices were followed. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.17 Troubleshoot and repair AC circuits using transformers

MEASUREMENT CRITERIA

1. Determined symptoms by comparing circuit operations with specifications.
2. Calculated values such as:
   - a. Voltage
   - b. Current
   - c. Power
   - d. Resistance
3. Analyzed circuits to locate fault(s).
4. Repaired circuit.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Problems of AC circuits using transformers were correctly identified within time limits using acceptable equipment and troubleshooting procedures. Repairs were accomplished and correct circuit operation demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.18 Understand principles and operations of AC differentiator and integrator circuits (determine RC and RL time constants)

MEASUREMENT CRITERIA

1. a. Described AC differentiator circuits.

   b. Described AC integrator circuits.

2. Calculated the effects of RC and RL on the integrator/differentiator circuits.

3. Listed common applications requiring the use of differentiator and integrator circuits.

RESULTS:

Demonstrated knowledge of the principles of operation of AC differentiator and integrator circuits by the completion of each activity. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.19 Fabricate and demonstrate the operation of differentiators and integrators

MEASUREMENT CRITERIA

1. Built differentiators and integrators circuits to specifications.

2. Calculated and graphed charging time based on:

    a. Voltage amplitude.
    b. Constants for differentiator and integrator circuits.
    c. Document the effects of long and short time constants on square wave voltages.

3. Measured the calculated differentiator and integrator constants.

4. Explained circuit operation and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate differentiators and integrators by the completion of each activity. A circuit which performed to specification was the final result. Necessary tools, equipment, and safety procedures were used. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.20 Troubleshoot and repair AC differentiator and integrator circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing circuit operations with specifications.

2. Calculated values such as:

   a. Time constants for differentiator and integrator circuits
   b. Charge/discharge times for RC/RL circuits

3. Analyzed circuits to locate fault(s).

4. Repaired circuits and verify the calculated.

5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Problems of AC differentiator and integrator circuits were correctly identified within time limits using acceptable equipment and troubleshooting procedures. Repairs were accomplished and correct circuit operations demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.21 Understand principles and operations of AC series and parallel resonant circuits

MEASUREMENT CRITERIA

1. Described characteristics of AC series and parallel resonant circuits.
2. Calculated values of the parameters of AC series and parallel resonant circuits.
3. Listed how AC series and parallel resonant circuits are commonly used.

RESULTS:

Demonstrated knowledge of AC series and parallel resonant circuits by the completion of each activity. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: AC Circuits

C. AC Circuits

Skill: C.22 Fabricate and demonstrate AC series and parallel resonant circuits

MEASUREMENT CRITERIA

1. Built series and parallel circuits.

2. Calculated:

    a. Q
    b. Resonant frequency
    c. Bandwidth

3. Made measurements to show circuit operates consistent with calculations.

4. Explained circuit operation and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate AC series and parallel resonant circuits by the completion of each activity. A circuit which performed to specification was the final result. Accepted safety, fabrication, and measurement practices were followed. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.23 Troubleshoot and repair AC series and parallel resonant circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing circuit(s) operations with specification(s).
2. Calculated voltages, reactances, bandwidth, and resonant frequency for circuit(s).
3. Analyzed circuits to locate fault(s).
4. Repaired circuit(s).
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Problems of AC series and parallel resonant circuits were identified within reasonable time limits using acceptable equipment and troubleshooting procedures. Repairs were accomplished and correct circuit operation demonstrated. All activities were performed using accepted safety, fabrication and measurement practices. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.24 Understand principles and operations of AC RC, RL,and RLC circuits

MEASUREMENT CRITERIA

1. a. Described the characteristics of RC, RL, and RLC circuit(s).

   b. Explained response curves for RC, RL, and RLC circuits.

2. Calculated the parameters for resistors, and reactances at different frequencies for RC, RL, and RLC circuits.

3. Listed the applications of RC, RL, and RLC circuits.

RESULTS:

Demonstrated knowledge of the principles and operations of AC RC, RL and RLC circuits by the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.25 Fabricate and demonstrate AC, RC, RL and RLC circuits

MEASUREMENT CRITERIA

1. Built AC RC, RL and RLC circuits (series, parallel, and complex) to specifications.
2. Calculated values such as voltage, reactance, bandwidth, and Q at different frequencies.
3. Made measurements to show circuit operates consisted with calculations.
4. Explained circuit operation and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate AC RC, RL and RLC circuits (series, parallel, and complex) by the completion of each activity. A circuit which performed to specification was the final result. Accepted safety, fabrication, and measurement practices were followed. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.26 Troubleshoot and repair AC,RC, RL and RLC circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing circuit operations with specifications.
2. Calculated voltages, currents, and reactances for the provided circuits.
3. Analyzed circuits to locate fault(s).
4. Repaired circuit.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Problems of AC RC, RL, and RLC circuits were correctly identified within time limits using acceptable equipment and troubleshooting procedures. Repairs were accomplished and correct circuit operations demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.27 Understand principles and operations of AC frequency selective filter circuits

MEASUREMENT CRITERIA

1. a. Described different types of filters such as:
    1) highpass
    2) low pass
    3) notch
    4) resonant band pass
    5) resonant band stop

   b. Compared ideal frequency selective filter circuits to practical circuits.

2. Calculated values of the parameters for the various types of filters and explained their effects on circuit band width.

3. Listed applications of the various types of filter circuits.

RESULTS:

Demonstrated knowledge of the principles and operations of AC frequency selective filter circuits by the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.28 Fabricate and demonstrate the operation of frequency selective filter circuits.

MEASUREMENT CRITERIA

1. Built selective filter circuits to specifications.
2. Calculated values of the parameters such as voltage, reactance, and Q at different frequencies for these circuits.
3. Made measurements to show circuit operates consistent with calculations.
4. Explained circuit operation and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate selective filter circuits by the completion of each activity. Circuit(s) which performed to specification(s) was the final result. Accepted safety, fabrication, and measurement practices were followed. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.29 Troubleshoot and repair AC frequency selective filter circuits.

MEASUREMENT CRITERIA

1. Determined symptoms by comparing circuit operations with specifications.
2. Calculated voltages, reactances, and resonant frequency for circuits.
3. Analyzed circuits to locate fault(s).
4. Repaired circuit.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Frequency selective filter circuit problems were correctly identified using appropriate equipment and troubleshooting procedures. Repairs were completed in a logical sequence which resulted in a circuit which met specifications. Work was completed using accepted safety, fabrication, and measurement practices within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.30 Understand principles and operations of AC polyphase circuits

MEASUREMENT CRITERIA

1. Described differences in wiring configurations, output voltages and circuits in polyphase circuits.
2. Described common applications of polyphase devices.
3. Explained circuits protective devices used for polyphase circuits.

RESULTS:

Demonstrated knowledge of AC polyphase circuits through the completion of these activities. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.31 Understand principles and operations of AC phase locked loop circuits

MEASUREMENT CRITERIA

1. Described the operation and applications of phase locked loop circuits.
2. Explained filtering and application of error voltage to VCO (voltage control oscillator) for FRPO (Frequency Response Phaseshift Oscillator) correction.
3. Listed the applications of AC phase locked loop circuits.

RESULTS:

Demonstrated knowledge of the principles and operations of AC phase locked loop circuits by the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

C. AC Circuits

Skill: C.32 Troubleshoot and repair AC phase locked loop circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing circuit operations (fabricated or simulated) with specifications.
2. Analyzed circuits to locate fault(s).
3. Repaired phase locked circuit.
4. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

AC circuits using phase locked loop were repaired using appropriate troubleshooting procedures. The repaired circuit performed to specifications. The activities were completed using proper equipment, fabrication and measurement practices, appropriate calculations, and established safety rules. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

D. Discrete Solid-State Devices

Skill: D.01 Demonstrate an understanding of the properties of semiconductor materials

MEASUREMENT CRITERIA

1. a. Explained the theory behind conductors and insulators.

   b. Described semiconductor materials and how they are made.

   c. Described types of semiconductor materials including N material and P materials and the properties associated with each semiconductor.

2. No calculations needed.

3. Listed examples of common electronic components which utilize semiconductor materials.

RESULTS:

Demonstrated knowledge of semiconductor material properties and identified the electronic components utilized in semiconductor materials. The function of the semiconductor materials were explained for each component. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

D. Discrete Solid-State Devices

Skill: D.02 Demonstrate an understanding of PN junctions

MEASUREMENT CRITERIA

1. a. Described how P semiconductor materials and N semiconductor materials are joined together to form a PN junction.

   b. Explained the function of a PN junction in electronic components.

   c. Applied electron/conventional theory and how it is effected by a PN junction.

2. No calculations needed.

3. Listed examples of common electronic components in which the PN junction is the basis of its operation.

RESULTS:

Demonstrated knowledge of PN junction principles and the ability to identify how different chemical and impurity makeups effect electron reaction. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

D. Discrete Solid-State Devices

Skill: D.03 Demonstrate an understanding of bipolar transistors

MEASUREMENT CRITERIA

1. a. Explained the difference between a diode and a bipolar transistor.

   b. Named the two types and described the design of bipolar transistors:

      i. NPN
      ii. PNP

   c. Identified the functions of each type of bipolar transistors.

2. No calculations needed.

3. Listed the common styles and configurations of bipolar transistors.

RESULTS:

Demonstrated knowledge of bipolar transistor principles and the ability to identify types and functions of bipolar transistors. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

D. Discrete Solid-State Devices

Skill: D.04 Demonstrate an understanding of Field Effect Transistors (FET's/MOS-FET's)

MEASUREMENT CRITERIA

1. a. Explained the difference between unipolar transistors and bipolar transistors.

   b. Explained how a Field Effect Transistor (FET) is designed and the functions that it performs.

   c. Applied the current movement principles to an FET.

   d. Explained the physical and operational difference between an IGFET (Insulated Gate Field Effect Transistor) and a MOSFET (Metal Oxide Semiconductor Field Effect Transistor).

   e. Explained the need and importance of special handling of FETs.

2. No calculations needed.

3. Listed applications of FETs.

RESULTS:

Demonstrated a knowledge of Field Effect Transistor principles and the ability to identify types and functions of Field Effect Transistors. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

D. Discrete Solid-State Devices

Skill: D.05 Demonstrate an understanding of special diodes and transistors

MEASUREMENT CRITERIA

1. a. Described the different types of special diodes such as:

    1) Zener diodes
    2) Varactor diodes
    3) Tunnel diodes
    4) Light emitting diodes

   b. Described the different types of transistors such as:

    1) Bipolar
    2) Field Effect (FET)
    3) Unijunction

2. No calculations needed.

3. Listed applications of special diodes and transistors, their primary functions, and how they work.

RESULTS:

Demonstrated knowledge of special diodes and transistor principles and the ability to identify the different types and functions. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

D. Discrete Solid-State Devices

Skill: D.06 Understand principles and operations of diode circuits

MEASUREMENT CRITERIA

1. Described the use of diodes in such circuits as:
    a. switcher circuits
    b. comparator circuits
    c. rectifier circuits
    d. detector circuits
    e. varactor circuits
    f. clippers, clamper, and multiplier circuits
2. Calculate parameters as required.
3. Listed common applications of diode circuits.

RESULTS:

Demonstrated knowledge of diode circuit principles and operations. Demonstrated the ability to recognize a diode circuit on a schematic and interpret the circuit layout and layout logic. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

D. Discrete Solid-State Devices

Skill: D.07 Fabricate and demonstrate diode circuits

MEASUREMENT CRITERIA

1. Built diode circuits to specifications.
2. Calculated values such as voltage, current, resistance, and power in diode circuits.
3. Made measurements consistent with calculations.
4. Explained circuit operations and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate diode circuits by the completion of each activity. A circuit which performed to specification was the final result. Necessary tools, equipment, and safety procedures were used. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

D. Discrete Solid-State Devices

Skill: D.08 Troubleshoot and repair diode circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing circuit(s) operations with specification(s).
2. Calculated values such as voltage, resistance, current and power.
3. Analyzed circuit(s) to locate fault(s).
4. Repaired diode circuit(s).
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Diode circuit problem(s) was corrected using logical troubleshooting procedures. The repaired circuit performed to specification. Proper tools were selected for repair(s), approved safety rules were followed, and appropriate calculations made as each activity was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

D. Discrete Solid-State Devices

Skill: D.09 Understand principles and operations of optoelectronic circuits (gate isolators, interrupt sensors, infra-red sensors, etc.)

MEASUREMENT CRITERIA

1. Described different types of optoelectronic devices and common applications.
2. Interpreted specification sheets for the different types of optoelectronic devices.
3. Described the optoelectronic circuits on a schematic diagram.
4. Listed applications of the various optoelectronic devices.

RESULTS:

Demonstrated knowledge of optoelectronic circuit principles and the ability to identify and interpret an optoelectronic circuit on a schematic. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

D. Discrete Solid-State Devices

Skill: D.10 Fabricate and demonstrate optoelectronic circuits (Gate isolators, interrupt sensors, infra-red sensors, etc.)

MEASUREMENT CRITERIA

1. Built optoelectronic circuits to specifications.
2. Calculated values such as voltage, current, resistance, and power in optoelectronic circuits.
3. Made measurements consistent with calculations.
4. Explained circuit operations and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate optoelectronic circuits by the completion of each activity. A circuit which performed to specification was the final result. Necessary tools, equipment, and safety procedures were used. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

D. Discrete Solid-State Devices

Skill: D.11 Troubleshoot and repair optoelectronic circuits. (Gate isolators, interrupt sensors, infra-red sensors, etc.)

MEASUREMENT CRITERIA

1. Determined symptoms by comparing circuit operations with specifications.
2. Calculated values such as of voltage, resistance, current and power.
3. Analyzed circuits to locate fault(s).
4. Repaired optoelectronic circuit(s).
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problems of optoelectronic circuits were corrected using logical troubleshooting procedures. The repaired circuit performed to specification. Proper tools were selected for repairs, approved safety rules were followed, and appropriate calculations made as each activity was completed, within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

D. Discrete Solid-State Devices

Skill: D.12 Understand principles and operations of single stage amplifiers

MEASUREMENT CRITERIA

1. a. Described how voltage and current amplification occurs in a single stage amplifier.

   b. Identified and described types of single stage amplifiers.

   c. Identified and described operational classes of single stage amplifiers.

   d. Reviewed square wave and sine wave principles and how they are effected by the abilities of a single stage amplifier.

2. Calculated parameters as required.

3. Listed applications of single stage amplifiers.

RESULTS:

Demonstrated knowledge of single stage amplifier principles and the ability to identify operational differences between the types of amplifiers. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

D. Discrete Solid-State Devices

Skill: D.13 Fabricate and demonstrate the operation of the single stage amplifiers

MEASUREMENT CRITERIA

1. a. Built common emitter, common base, and common collector amplifiers to specifications.

   b. Built BJT (Bipolar Junction Transistor) and JFET (Junction Field Effect Transistors) amplifiers in the different classes of amplifiers.

2. Calculated values of voltage, current, and/or power gain in single stage amplifier circuits.

3. Made measurements consistent with calculations.

4. Explained circuit operations and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate single stage amplifiers by completion of each activity. Accurate measurement, established safety standards, and appropriate tools were used to perform each activity. The work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

D. Discrete Solid-State Devices

Skill: D.14 Troubleshoot and repair single-stage amplifiers

MEASUREMENT CRITERIA

1. Determined symptoms by comparing single-stage amplifiers operations with specifications.
2. Calculated values of voltage, current and/or power gain.
3. Analyzed circuits to locate fault(s).
4. Repaired single-stage amplifiers circuit.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

The circuit problem was identified using acceptable equipment and troubleshooting procedures. The repaired amplifier performed to specification. Accepted safety, fabrication and measurement practices were performed in the completion of the activities. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

D. Discrete Solid-State Devices

Skill: D.15 Understand principles and operations of thyristor circuitry (SCR, TRIAC, DIAC, etc.)

MEASUREMENT CRITERIA

1. Explained the principles of thyristors.
2. Listed examples of common uses of different thyristor circuitry.
3. Identified thyristor circuits diagrams on schematic diagrams.

RESULTS:

Demonstrated understanding of thyristor circuitry and their various uses. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

D. Discrete Solid-State Devices

Skill: D.16 Fabricate and demonstrate thyristor circuitry (SCR, TRIAC, DIAC, etc.)

MEASUREMENT CRITERIA

1. Built thyristor circuits to specifications.
2. Calculated values such as voltage, current, resistance, power and pulse timing and durations in thyristor circuits.
3. Made measurements consistent with calculations.
4. Explained thyristor circuitry operations and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate thryistor circuitry by the completion of each activity. Accurate measurement, established safety standards, and appropriate tools were used to perform each activity. The work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

D. Discrete Solid-State Devices

Skill: D.17 Troubleshoot and repair thyristor circuitry (SCR, TRIAC, DIAC, etc.)

MEASUREMENT CRITERIA

1. Determined symptoms by comparing thyristor circuit operations with specifications.
2. Calculated values such as voltage, current, resistance, power and pulse timing and durations in thyristor circuits.
3. Analyzed circuits to locate fault(s).
4. Repaired thyristor circuitry.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problems of thyristor circuitry were corrected using logical troubleshooting procedures. The repaired circuit performed to specification. Proper tools were selected for repairs, approved safety rules were followed, and appropriate calculations made.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.01 Understand principles and operations of multistage amplifiers

MEASUREMENT CRITERIA

1. a. Discussed the functions of multistage amplifiers in electronic equipment.

   b. Explained the operational principles associated with placing amplifiers in sequence.

   c. Explained single ended, push-pull, and complementary symmetry audio amplifier circuits and their characteristics.

   d. Analyzed the method of coupling and impedance matching employed in audio amplifiers.

   e. Listed examples of common types of signals and how they are utilized in multistage amplification including audio, video and radio frequency circuits.

   f. Explained a method of volume and tone control.

   g. Described the function of transducers used in audio amplifiers.

2. Calculated voltage, current, resistance, power, impedance, stage gains and total gains as necessary.

3. a. Listed examples of common uses of multistage amplifiers including signal wave current shaping, voltage gain and noise reduction.
   b. Listed examples of common types of electronic equipment and how they utilize multistage amplifiers.
   c. Listed applications of the various types of multistage amplifiers.

RESULTS:

Demonstrated knowledge of various multistage amplifiers operations and the ability to identify types of multistage amplifier equipment and their associated functions. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.02 Fabricate and demonstrate the operation of multistage amplifiers

MEASUREMENT CRITERIA

1. Built multistage amplifier using Bipolar Junction Transistors (BJT) and Field Effect Transistors (FET) devices to specifications.
2. Calculated voltage, current, resistance, power, impedance, stage gains and total gains as necessary.
3. Made measurements consistent with calculations.
4. Explained multistage operations and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate multistage amplifiers by the completion of each activity. A circuit which performed to specifications was the final result. Necessary tools, equipment and required safety procedures were used. Proper circuit laws were used and calculations were correct. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.03 Troubleshoot and repair multistage amplifiers

MEASUREMENT CRITERIA

1. Determined symptoms by comparing multistage amplifier operations with its specifications.
2. Calculated voltage, current, resistance, power, impedance, stage gain and total gain as necessary.
3. Analyzed circuits to locate fault(s).
4. Repaired multistage amplifier.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problem(s) associated with multistage amplifiers was identified using acceptable equipment and troubleshooting procedures. Repairs were accomplished and correct circuit operations demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.04 Understand principles and operations of IF circuits

MEASUREMENT CRITERIA

1. Described the theory of intermediate frequency signals to include:
    - a. common types of intermediate frequency circuits.
    - b. IF signal conversion from one signal type to another
    - c. IF signal extraction from the original signal frequency
    - d. IF circuit layout on a schematic diagram
2. Calculated values such as IF frequency, oscillator frequencies, and resultant frequencies.
3. Listed examples of common types of electronic equipment which utilize IF circuits.

RESULTS:

Demonstrated knowledge of intermediate frequency circuits principles and the ability to identify a IF circuit on a schematic diagram and interpret the logic of the circuit. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.05 Fabricate and demonstrate IF circuits

MEASUREMENT CRITERIA

1. Built IF circuit using BJT and FET devices to specifications.
2. Calculated values such as IF frequency, oscillator frequencies, and resultant frequencies.
3. Made measurements consistent with calculations.
4. Explained IF circuit operations and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate, and test IF circuit component layout by the completion of each activity. All activities were performed using accepted safety, fabrication, and measurement practices. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.06 Troubleshoot and repair IF circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing IF circuits operations with specifications.
2. Calculated values such as voltage, current, resistance, power, impedance, oscillator frequencies and resultant frequencies.
3. Analyzed circuits to locate fault(s).
4. Repaired IF circuits.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Determined faulty portion of circuit and repaired problem. Checked correctly and replaced faulty component. All activities were performed using accepted safety, fabrication, and measurement practices. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.07 Understand principles and operations of linear power supplies and filters

MEASUREMENT CRITERIA

1. a. Described the purpose of a power supply and listed the circuits needed.

   b. Described the theory of operation of linear power supplies and filters.

   c. Explained voltage fluctuation including ripples, spikes, surges, etc.

   d. Explained when the series regulator is preferred over the shunt regulator.

2. Calculated values such as voltage, current, resistance and power.

3. Listed applications using linear power supplies and filters.

RESULTS:

Demonstrated knowledge of the operation of linear power supplies and filters. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician .

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.08 Fabricate and demonstrate linear power supplies and filters

MEASUREMENT CRITERIA

1. Built linear power supplies and filters to specifications.
2. Calculated values such as output voltage, current, load, and power requirements.
3. Made measurements consistent with calculations.
4. Explained linear power supplies and filters and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate power supplies and filters by the completion of each activity. A circuit which performed to specifications was the final result. Necessary tools, equipment and required safety procedures were used. Proper circuit laws were used and calculations were correct. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.09 Troubleshoot and repair linear power supplies and filters

MEASUREMENT CRITERIA

1. Determined symptoms by comparing linear power supplies and filters with specifications.
2. Calculated values such as voltage, current, load and power as necessary.
3. Analyzed circuits to locate fault(s).
4. Repaired linear power supplies and filters circuits.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problem(s) were identified within time limits using acceptable equipment and troubleshooting procedures. Repair(s) were accomplished and correct circuit operations demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.10 Understand principles and operations of operational amplifier circuits

MEASUREMENT CRITERIA

1. a. Explained electrical and mathematical theory associated with operational amplifier circuits such as:

    1) open loop
    2) closed loop
    3) gain/bandwidth (GBT)
    4) differential amplifier

   b. Explained operation of circuits such as:

    1) inverting amplifier circuits
    2) non-inverting amplifier circuits
    3) summing amplifier circuits
    4) comparitor circuits

2. Calculated values such as voltage, current, resistance, and gain as necessary.

3. Listed examples of applications using operational amplifier circuits.

RESULTS:

Demonstrated understanding of operations of operational amplifier circuits by ability to complete above activities. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.11 Fabricate and demonstrate operational amplifier circuits

MEASUREMENT CRITERIA

1. Built operational amplifier circuits to specifications.
2. Calculated values such as voltage, input/output resistance, bandwidth, and gain as necessary.
3. Made measurements consistent with calculations.
4. Explained operational amplifier circuits and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate operational amplifier circuits by the successful completion of each activity using acceptable safety, fabrication, and measurement procedures. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.12 Troubleshoot and repair operational amplifier circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing operational amplifier circuits to specifications.
2. Calculated values such as voltages, input/output resistance, bandwidth, and gain as necessary.
3. Analyzed circuits to locate fault(s).
4. Repaired operational amplifier circuits.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problem(s) of operational amplifier circuits was identified using acceptable equipment and troubleshooting procedures. Repairs(s) were accomplished and correct circuit operations demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices. All work was performed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.13 Understand principles and operations of audio power amplifiers

MEASUREMENT CRITERIA

1. a. Described theory of operation of audio power amplifiers.

   b. Described and listed the classes of operation of audio power amplifiers (A, A&B, B).

   c. Described impedance matching requirements in audio power amplifiers.

   d. Described the relationship between the power source amplifier output power and load.

2. Calculated voltage, current, power transfer, impedance, power, and gain as necessary.

3. Listed applications of the various classes of audio power amplifiers.

RESULTS:

Demonstrated understanding of principles and operations of audio power amplifiers by completing above activities. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.14 Fabricate and demonstrate audio power amplifiers

MEASUREMENT CRITERIA

1. Built audio power amplifiers to specifications.
2. Calculated voltage, current, power transfer, impedance, power, and gain as necessary.
3. Made measurements consistent with calculations.
4. Explained audio power amplifiers operation and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate audio power amplifiers by completion of each of the activities. Accepted safety, fabrication, and measurement procedures were used. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.15 Troubleshoot and repair audio power amplifiers

MEASUREMENT CRITERIA

1. Determined symptoms by comparing audio power amplifiers to specifications.
2. Calculated voltage, current, power transfer, impedance, power, and gain as necessary.
3. Analyzed circuits to locate fault(s).
4. Repaired audio power amplifiers.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problem(s) was identified using acceptable equipment and troubleshooting procedures. Repair(s) was accomplished and correct circuit operations demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.16 Understand principles and operations of regulated and switching power supply circuits

MEASUREMENT CRITERIA

1. a. Described regulated power supply circuits such as voltage regulation and current regulation in either series or parallel configurations.

   b. Explained the theory of operation of switching power supplies.

2. Calculated values such as output voltage, current, load, and power for switching, and linear regulated power supplies.

3. Listed examples of common high speed switching power supply.

RESULTS:

Demonstrated knowledge of regulated and switching power supplies by successful completion of each of the activities. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.17 Troubleshoot and repair regulated and switching power supply circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing switching power supply circuits (fabricated or simulated) to specifications.
2. Calculated values such as output voltage, current, load, and power for switching and linear regulated power supplies.
3. Analyzed circuits to locate fault(s).
4. Repaired power supply circuits.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problem(s) was corrected using acceptable equipment and troubleshooting procedures. Repairs were accomplished and correct circuit operations demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.18 Understand principles and operations of active filter circuits

MEASUREMENT CRITERIA

1. Described the theory of active filter circuits which could include:
   a. Low pass
   b. High pass
   c. Band pass
   d. Band block (notch or stop)
   e. Etc.
2. Listed examples of common applications of active filter circuits applications.
3. Calculated gain, impedance, and frequency response for specified active filter circuits.

RESULTS:

Demonstrated knowledge of active filter circuits by successfully completing each activity within acceptable tolerances. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.19 Troubleshoot and repair active filter circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing active filter circuits (fabricated or simulated) to specifications.
2. Calculated gain, impedance, and frequency response for specified active filter circuits.
3. Analyzed circuits to locate fault(s).
4. Repaired active filter circuits.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problem(s) of active filter circuits was identified using acceptable equipment and troubleshooting procedures. Repairs(s) were accomplished and correct circuit operations demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices. All work was performed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.20 Understand principles and operations of sinusoidal and non-sinusoidal oscillator circuits

MEASUREMENT CRITERIA

1. Described the theory of sinusoidal and non-sinusoidal oscillator circuits which could include:

   a. Colpitts oscillator
   b. Clapp oscillator
   c. Hartley oscillator
   d. Armstrong oscillator
   e. Phaseshift oscillator
   f. Wein Bridge oscillator
   g. Crystal oscillator

2. Interpreted schematics of sinusoidal and non-sinusoidal oscillator circuits which could include:

   a. Colpitts oscillator
   b. Clapp oscillator
   c. Hartley oscillator
   d. Armstrong oscillator
   e. Phaseshift oscillator
   f. Wein Bridge oscillator
   g. Crystal oscillator

3. Calculated input and output impedance and frequency for specified sinusoidal and non-sinusoidal oscillator circuits.

4. Listed examples of common applications of sinusoidal and non-sinusoidal oscillator circuits.

RESULTS:

Demonstrated knowledge of oscillator circuits by successfully completing each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.21 Troubleshoot and repair sinusoidal and non-sinusoidal oscillator circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing sinusoidal and non-sinusoidal oscillator circuit(s) (simulated or fabricated) to specifications.
2. Calculated values such as output impedance and frequency for specified sinusoidal and non-sinusoidal oscillator circuits.
3. Analyzed circuit(s) to locate fault(s).
4. Repaired sinusoidal and non-sinusoidal oscillator specified circuits.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problem(s) was corrected using acceptable equipment and troubleshooting procedures. Repair(s) was accomplished and correct circuit operations demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.22 Understand principles and operations of fiber optic circuits using photodiodes or LASERS

MEASUREMENT CRITERIA

1. a. Described the theory of fiber optics

    a. Physics of light generation
    b. Laser diode and light emitting diode
    c. Function of essential parts of any fiber optic system
    d. Principle of optoelectronic transducers
    e. Fiber optic and signal attenuation
    f. Characteristics of cables, couplers, and connectors
    g. Etc.

   b. Described the theory and operation of fiber optic circuits using photodiodes and LASERS

2. Calculation not required.

3. Listed examples of common applications of fiber optic electronics.

RESULTS:

Demonstrated knowledge of fiber optic circuits by successfully completing each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.23 Troubleshoot and repair fiber optic circuits using photodiodes or LASERS

MEASUREMENT CRITERIA

1. Determined symptoms by comparing fiber optics circuit (fabricated or simulated) to specifications.

2. No calculations needed.

3. Analyzed circuits to locate fault(s).

4. Repaired fiber optic circuits.

5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problem(s) was corrected using acceptable equipment and troubleshooting procedures. Repair(s) was accomplished and correct circuit operation of fiber optic circuits was demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.24 Understand principles and operations of RF circuits

MEASUREMENT CRITERIA

1. a. Described the allocation of the RF frequency spectrum by the National Telecommunications and Information Administration (NTIA) and the FCC.

   b. Explained the relationship between antenna utilization and frequency band.

2. Explained the theory and operation of RF circuitry for each of the frequency bands.

3. Calculated values such as frequencies and power output.

4. Listed examples of common applications of these RF circuits.

RESULTS:

Demonstrated understanding of principles and operations of RF circuits by ability to complete above activities. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician .

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.25 Fabricate and demonstrate RF circuits

MEASUREMENT CRITERIA

1. Built RF circuit(s) to specification(s).
2. Calculated values such as frequencies and power out.
3. Made measurements consistent with calculations.
4. Explained RF circuit(s) and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate RF circuits by constructing a high frequency amplifier within radio frequency range. All activities were performed using accepted safety, fabrication, and measurement practices. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.26 Troubleshoot and repair RF circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing RF circuit(s) to specification(s).
2. Calculated parameters as necessary.
3. Analyzed circuit(s) to locate fault(s).
4. Repaired RF circuit(s).
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Demonstrated ability to troubleshoot and repair RF circuits by completion of above activities. All activities were performed using accepted safety, fabrication, and measurement practices. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.27 Understand principles and operations of signal modulation systems (AM, FM, Stereo)

MEASUREMENT CRITERIA

1. Described the theory and operation of AM, FM, PM, and Stereo (fabricated or simulated) signal modulation systems.
2. Calculated percent of modulation.
3. Listed examples of common applications of AM, FM, PM, and Stereo signal modulation systems.

RESULTS:

Demonstrated ability to understand principles and operations of signal modulation systems. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.28 Troubleshoot and repair signal modulation systems (AM, FM, Stereo)

MEASUREMENT CRITERIA

1. Determined symptoms by comparing signal modulation systems (AM, FM, PM, Stereo) (fabricated or simulated) to specifications.
2. Calculate percent of modulation.
3. Analyzed circuits to locate fault(s).
4. Repaired signal modulation system(s) (AM, FM, PM, Stereo).
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Demonstrated ability to troubleshoot and repair signal modulation systems. All activities were performed using accepted safety, fabrication, and measurement practices. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.29 Demonstrate an understanding of motor phase shift control circuits

MEASUREMENT CRITERIA

1. a. Described the function of a motor phase shift control (servomotor).

   b. Listed components that makes up a motor phase shift control circuit.

   c. Described the operational principles and circuits associated with a self-correcting closed loop control system which utilizes motor phase shift control circuits.

2. No calculations necessary.

3. Listed equipment that utilizes motor phase shift control circuits.

RESULTS:

Demonstrated understanding of motor phase shift control circuits. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

E. Analog Circuits

Skill: E.30 Understand principles and operations of microwave circuits

MEASUREMENT CRITERIA

1. a. Described theory and operation of microwave circuits such as:

    1) klystrons
    2) magnatrons
    3) microwave diodes

    b. Explained wave guide theory.

    c. Described and explained applicable safety practices associated with microwave technology.

2. No calculations necessary.

3. Listed examples of common applications of microwave circuits.

RESULTS:

Demonstrated understanding of microwave circuits. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.01 Demonstrate an understanding of the characteristics of integrated circuit (IC) logic families

MEASUREMENT CRITERIA

1. a. Described the IC logic families such as TTL and CMOS.

   b. Described the characteristics of the logic families using specification sheet information such as: I/O voltage levels, fan-out, current levels, and pin-out configurations.

2. No calculations necessary.

3. Listed examples of common applications of IC logic families.

RESULTS:

Demonstrated knowledge of integrated circuit logic families by the completion of the activities. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.02 Demonstrate an understanding of minimizing logic circuits using Boolean operations

MEASUREMENT CRITERIA

1. Described how to minimize logic circuits utilizing Boolean operations, Karnaugh mapping, and DeMorgans Theorem.
2. Used theorem to develop minimized expression.

RESULTS:

Demonstrated knowledge of logic circuits by using Boolean operations, Karnaugh mapping, and DeMorgans Theorem. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.03 Understand principles and operations of linear integrated circuits

MEASUREMENT CRITERIA

1. Described the principle of linear integrated circuits as it applies to digital circuits such as comparitors, timers, and I/O peripheral devices.
2. No calculations necessary.
3. Listed examples of common digital applications of linear integrated circuits.

RESULTS:

Demonstrated knowledge of linear integrated circuits by successful completion of all tasks. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.04 Troubleshoot and repair linear integrated circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing linear integrated circuit operation to specifications (e.g., 555 timer).
2. Calculated values such as frequency of the timer circuit and other necessary parameters.
3. Analyzed circuits to locate fault(s).
4. Removed and replaced linear integrated circuits.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Demonstrated knowledge of the principles and operations of digital applications of linear integrated circuits by the completion of the activities. Accurate measurement, established safety standards, and appropriate tools were used to perform each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.05 Understand principles and operations of types of logic gates

MEASUREMENT CRITERIA

1. a. Described the theory and operation of logic gates such as:
    - a. AND
    - b. OR
    - c. NAND
    - d. NOR
    - e. Inverter
    - f. XOR

   b. Described voltage logic levels for TTLs and CMOS.

2. Matched the appropriate truth table to each logic gate.

3. Listed examples of common applications of basic logic gates used in electronics.

RESULTS:

Demonstrated knowledge of the principles and operations of types of logic gates by the completion of the activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.06 Fabricate and demonstrate types of logic gates

MEASUREMENT CRITERIA

1. Built logic gate circuits to specification.
2. Proved the logic gates by developing the truth tables.
3. Measured gate input and output to validate circuit operation.
4. Explained reasons for circuit operation and how the anticipated result was determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate logic gates by successfully completing each activity using acceptable safety, fabrication, and measurement procedures. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.07 Troubleshoot and repair types of logic gate circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing logic gate circuits to specifications.
2. Analyzed circuits to locate fault(s).
3. Repaired logic gate circuit(s).
4. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problem(s) was correctly identified within time limits using acceptable equipment and troubleshooting procedures. Repair(s) was accomplished and correct circuit operation of logic gate circuits demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.08 Understand principles and operations of combinational logic circuits

MEASUREMENT CRITERIA

1. Described how gating or switching logic circuits operate in combination including AND, NAND, NOR and OR.
2. Calculated the output of a combinational circuit by applying the appropriate truth tables to the individual logic circuits.
3. Listed applications for combinational logic circuits.

RESULTS:

Demonstrated understanding of principles and operations of combination logic circuits by completing above activities. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.09 Fabricate and demonstrate combinational logic circuits

MEASUREMENT CRITERIA

1. Built combinational logic circuits to specifications.
2. Calculated the output of combinational logic circuits by applying appropriate truth tables to the individual logic circuits.
3. Made measurements consistent with calculations to confirm current circuit operations.
4. Explained combinational logic circuits and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate logic gates using acceptable safety, fabrication, and measurement procedures. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.10 Troubleshoot and repair combinational logic circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing combinational logic circuits to specifications.
2. Calculated the output of the combinational logic circuits by applying appropriate truth tables to the individual logic circuits.
3. Analyzed circuit(s) to locate fault(s).
4. Repaired combinational logic circuit(s).
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problem(s) of combinational logic circuits was correctly identified within time limits using acceptable equipment and troubleshooting procedures. Repair(s) was accomplished and correct circuit operations demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.11 Understand principles and operations of types of flip-flop circuits

MEASUREMENT CRITERIA

1. Explained the theory and operation of flip-flop circuits such as:
    a. RS
    b. Clock RS
    c. JK
2. Calculated truth tables for Flip-Flop circuits.
3. Listed examples of applications of flip-flop circuits.

RESULTS:

Demonstrated knowledge of the principles and operations of types of flip-flop circuits by the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.12 Fabricate and demonstrate the operation of flip-flop circuits

MEASUREMENT CRITERIA

1. Built flip-flop circuits to provided specifications.
2. Developed the appropriate truth tables, state diagrams, or timing diagrams to validate Flip-Flop circuit(s).
3. Measured flip-flop output to validate truth tables.
4. Explained flip-flop circuits and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate flip-flop circuits by completing each activity using acceptable safety, fabrication, and measurement procedures. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.13 Troubleshoot and repair flip-flop circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing flip-flop circuits to specifications.
2. Developed the appropriate truth tables, state diagrams, or timing diagrams for each flip-flop circuit.
3. Analyzed circuits to locate fault(s).
4. Repaired flip-flop circuits.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problem(s) was identified within time limits using acceptable equipment and troubleshooting procedures. Repair(s) was accomplished and correct operation of flip/flop circuits demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices. Work was completed within a reasonable time frame.

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Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.14 Understand principles and operations of types of registers and counters

MEASUREMENT CRITERIA

1. Described the theory and operation of registers and counters such as:
    - a) serial in/parallel out
    - b) serial in/serial out
    - c) parallel in/serial out
    - d) registers as storage devices
    - e) counters as frequency dividers
    - f) synchronous counters
    - g) asynchronous counters
2. Developed timing diagrams, state diagrams, or truth tables for registers and synchronous and asynchronous counters.
3. Listed examples of applications of registers and counters in digital circuits.

RESULTS:

Demonstrated knowledge of the principles and operations of registers and counters by the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.15 Fabricate and demonstrate types of registers and counters

MEASUREMENT CRITERIA

1. Built registers and counters to specifications.
2. Developed the appropriate truth tables, state diagrams, or timing diagrams and timing diagrams to test registers and counters.
3. Made measurements consistent with calculations.
4. Explained registers and counters and how the anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate types of registers and counters by completion of each activity. Each activity was completed using accepted safety, fabrication, and measurement procedures. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.16 Troubleshoot and repair types of registers and counters

MEASUREMENT CRITERIA

1. Determined symptoms by comparing registers and counters to specifications.
2. Developed the appropriate truth tables, state diagrams, or timing diagrams to test registers and counters.
3. Analyzed circuits to locate fault(s).
4. Repaired register and counter circuit(s).
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problem(s) was correctly identified within time limits using acceptable equipment and troubleshooting procedures. Repair(s) was accomplished and correct circuit operation of register and counters demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.17 Understand principles and operations of clock and timing circuits

MEASUREMENT CRITERIA

1. a. Described the theory and operation of clock and timing circuits such as:
    1) oneshot Schmitt trigger
    2) 555 timer
    3) crystal oscillator

   b. Identified timing circuits from a schematic.

2. Calculated values such as the appropriate timing frequency and pulse duration.

3. Listed examples of common applications of clock and timing circuits.

RESULTS:

Demonstrated knowledge of the principles and operation of clock and timing circuits was demonstrated by the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.18 Fabricate and demonstrate clock and timing circuits

MEASUREMENT CRITERIA

1. Built clock and timing circuits to specifications.
2. Calculated the pulse width, deviation, and frequency.
3. Measured each circuit operation.
4. Explained how anticipated results were determined.

RESULTS:

Demonstrated knowledge of and ability to fabricate the operation of clock and timing circuits by completing each activity using accepted safety, fabrication, and measurement procedures. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.19 Troubleshoot and repair clock and timing circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing clock and timing circuit(s) to specification(s).
2. Calculated the pulse width, divention, and frequency.
3. Analyzed circuit(s) to locate fault(s).
4. Repaired clock and timing.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problem(s) was correctly identified, repaired, and demonstrated within time limits using acceptable equipment and troubleshooting procedures. All activities were performed using accepted safety, fabrication, and measurement practices.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.20 Understand principles and operations of types of arithmetic-logic circuits

MEASUREMENT CRITERIA

1. Described how arithmetic logic circuits are used to achieve functions which could include:

   a. add
   b. subtract
   c. multiple
   d. divide
   e. square
   f. root

2. Used the Boolean process to calculate the circuit output and explain the arithmetic functions.

3. Listed examples of common to arithmetic-logic circuits.

RESULTS:

Demonstrated knowledge of the arithmetic-logic circuits by successfully completing each of the activities. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.21 Troubleshoot and repair types of arithmetic-logic circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing arithmetic-logic circuits (fabricated or simulated) to specifications.
2. Used the Boolean process to calculate the circuit output and explain the arithmetic functions.
3. Analyzed circuits to locate fault(s).
4. Repaired arithmetic-logic circuits.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problem(s) of arithmetic-logic circuit was correctly identified, repaired, and demonstrated within time limits using accepted equipment and troubleshooting procedures. All activities were performed using accepted safety, fabrication, and measurement practices.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.22 Understand principles and operations of types of multiplexer and de-multiplexer circuits

MEASUREMENT CRITERIA

1. Described the theory and operation of multiplexer and de-multiplexer circuits.
2. Validated circuit characteristics of multiplexer and demultiplexer circuits as necessary.
3. Listed examples of common applications of multiplexer and de-multiplexer circuits.

RESULTS:

Demonstrated knowledge of the multiplexer and de-multiplexer circuits by successfully completing each of the activities. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.23 Troubleshoot and repair multiplexer and de-multiplexer circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing multiplexer and de-multiplexer circuits (fabricated or demonstrated) to specifications.
2. Validated circuit characteristics of multiplexer and demultiplexer circuits as necessary.
3. Analyzed circuits to locate fault(s).
4. Repaired circuits as necessary.
5. Explained the procedure(s) and reason(s) for the action(s) taken.

RESULTS:

Circuit problem(s) was correctly identified within time limits using acceptable equipment and troubleshooting procedures. Repair(s) was accomplished and correct circuit operation of multiplexer and de-multiplexer circuits demonstrated. All activities were performed using accepted safety, fabrication, and measurement practices.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.24 Understand principles and operations of types of digital to analog and analog to digital circuits

MEASUREMENT CRITERIA

1. Described the operation of digital-to-analog (D to A) and analog-to-digital (A to D) conversion circuits.
2. Verified conversion tables for digital-to-analog and analog-to-digital conversion circuits.
3. Listed applications of digital-to-analog and analog-to-digital circuits.

RESULTS:

Demonstrated knowledge of digital-to-analog and analog-to-digital circuits through the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.25 Troubleshoot and repair types of digital-to-analog and analog-to-digital circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing the operation of digital-to-analog (D to A) and analog-to-digital (A to D) conversion circuits (fabricated or simulated) with specification.
2. Verified conversion tables for D to A and A to D conversion circuits.
3. Analyzed circuit(s) to locate fault(s)
4. Repaired digital-to-analog and analog-to-digital conversion circuits.
5. Explained the procedure(s) and reason(s) for action(s) taken.

RESULTS:

Circuit problem(s) was identified within time limits using common tools and test equipment while adhering to acceptable troubleshooting procedures. Appropriate circuit repairs were accomplished within acceptable standards of quality and safety.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.26 Understand principles and operations of types of digital display circuits

MEASUREMENT CRITERIA

1. Described the operation of digital display circuits such as hexadecimal and binary coded decimal decoding.
2. Verified truth tables for digital display circuits.
3. Listed applications of digital display circuits.

RESULTS:

Demonstrated knowledge of the principle and operation of digital display circuits through the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.27 Troubleshoot and repair types of digital display circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing the operation of digital display circuits (fabricated or simulated) with specifications.
2. Verified truth tables for digital display circuits.
3. Analyzed circuit(s) to locate fault(s).
4. Repaired digital display circuits.
5. Explained the procedure(s) and reason(s) for action(s) taken.

RESULTS:

Circuit problem(s) was identified within time limits using common tools and test equipment while adhering to acceptable troubleshooting procedures. Appropriate circuit repairs were accomplished within acceptable standards of quality and safety.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.28 Understand principles and operations of power distribution and noise problems

MEASUREMENT CRITERIA

1. a. Described the principles and operations of power distribution in digital IC circuits such as fanin and fanout, power dissipation of logic circuits, speed-vs-power tradeoffs, and static and transient internal and external noise on digital circuits.

   b. Listed and explained the common causes of noise problems in digital circuits.

   c. Described and explained various ways to prevent or correct noise problems in digital circuits.

2. Calculated the output and power levels according to the fanin/fanout capability.

RESULTS:

Demonstrated knowledge of the principles and operation of power distribution and noise control in digital circuits through the completion of each activity. Work was completed in a reasonable period of time.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.29 Troubleshoot and repair power distribution and noise problems

MEASUREMENT CRITERIA

1. Determined symptoms by comparing the operation of power distribution circuits (fabricated or demonstrated) with specification.
2. Calculated output and power levels according to fanin/fanout capability.
3. Analyzed power distribution circuit(s) to locate fault(s).
4. Repaired power distribution circuits to eliminate or reduce noise problems.
5. Explained the procedure(s) and reason(s) for action(s) taken.

RESULTS:

Circuit problem(s) was identified within time limits using common tools and test equipment while adhering to acceptable troubleshooting procedures. Appropriate circuits repairs were accomplished using accepted safety, fabricated, and measurement practices.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.30 Understand principles and operations of types of digital encoders and decoders

MEASUREMENT CRITERIA

1. Described the operation of digital encoders and decoders.
2. Verified the truth tables, timing, and processing sequences associated with encoder and decoder circuits.
3. Listed and explained the common applications of encoder and decoder circuits.

RESULTS:

Demonstrated knowledge of the principle and operation of encoder and decoder circuits through the completion of each activity. Work was completed in a reasonable period of time.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.31 Troubleshoot and repair types of digital encoders and decoders

MEASUREMENT CRITERIA

1. Determined symptoms by comparing the operation of encoder and decoder circuits (fabricated or simulated) with specification.
2. Verified the truth tables, timing, and processing sequences associated with encoder and decoder circuits.
3. Analyzed encoder and decoder circuits to locate fault(s).
4. Repaired circuit(s).
5. Explained the procedure(s) and reason(s) for action(s) taken.

RESULTS:

Circuit problem(s) was identified within time limits using common tools and test equipment while adhering to acceptable troubleshooting procedures. Appropriate circuit repairs were accomplished within acceptable standards of quality and safety.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.32 Understand principles and operations of digital display devices

MEASUREMENT CRITERIA

1. Explained the principles and operations of digital display devices which may include:
   a. LED displays
   b. LCD displays
   c. Etc.
2. Verified truth tables and calculated voltage(s), current(s), and resistance(s) for digital display devices.
3. Listed and explained the common uses and applications of digital display devices.

RESULTS:

Demonstrated knowledge of the principle and operation of digital display devices through the completion of each activity. Work was completed in a reasonable time.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

F. Digital Circuits

Skill: F.33 Troubleshoot and repair digital display devices

MEASUREMENT CRITERIA

1. Determined symptoms by comparing the operation of fabricated or simulated circuits containing digital display devices with specification.
2. Verified truth tables and calculated voltage(s), current(s), and resistance(s) for the digital display devices.
3. Analyzed digital display devices to locate fault(s).
4. Repaired circuit(s) containing the device.
5. Explain the procedure(s) and reason(s) for action(s) taken.

RESULTS:

Circuit problem(s) was identified within time limits using common tools and test equipment while adhering to acceptable troubleshooting procedures. Appropriate circuit repairs were accomplished within acceptable standards of quality and safety.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

3. Microprocessors

Skill: G.01 Demonstrate an understanding of microprocessor interfaces

MEASUREMENT CRITERIA

1. Described the interfaces to a microprocessor and the operation of each, e.g.,
   - a. store and fetch information
   - b. data buss operation
   - c. interrupt controller
   - d. synchronous and asynchronous operation
2. Created timing and data diagrams to illustrate the operation of a data bus and interrupt controller.
3. Listed applications of interfaces.

RESULTS:

Demonstrated knowledge of the principle and operation of microprocessor interfaces through the completion of each activity. Work was completed in a reasonable period of time.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

G. Microprocessors

Skill: G.02 Troubleshoot and repair microprocessor interfaces

MEASUREMENT CRITERIA

1. Determined symptoms by comparing the operation of fabricated or simulated microprocessor interface(s) such as the bus controller and interrupt controller with specifications.
2. Analyzed interfaces to locate fault(s).
3. Repaired interface circuit(s).
4. Explained the procedure(s) and reason(s) for action(s) taken.

RESULTS:

Circuit problems(s) was identified within time limits using common tools and test equipment while adhering to acceptable troubleshooting procedures. Appropriate circuit repairs were accomplished within acceptable standards.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

G. Microprocessors

Skill: G.03 Demonstrate an understanding of essential microprocessor components

MEASUREMENT CRITERIA

1. Described a block diagram of essential microprocessor components such as:
    a. Arithmetic Logic Units (ALU)
    b. index registers (IU)
    c. storage registers (SU)
    d. internal buss
2. Verified timing and data diagrams to illustrate the operation of ALU, index register, and internal buss circuits.
3. Listed some applications of microprocessors.

RESULTS:

Demonstrated knowledge of the principle and operation of ALU, index register, segment register, and internal bus circuits through the completion of each activity. Work was completed in a reasonable period of time.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

G. Microprocessors

Skill: G.04 Demonstrate an understanding of microprocessor BUS concepts

MEASUREMENT CRITERIA

1. Described the function of microprocessor bus concepts which could include:
    a. Timing bus sequence
    b. Data and address bus
    c. Controller circuit
    d. Clock and timing generation circuits
    e. Etc.

2. Verified truth tables.

RESULTS:

Demonstrated knowledge of microprocessor BUS concepts by the completion of each activity. Proper circuit laws were used and calculations were correct. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

G. Microprocessors

Skill: G.05 Demonstrate an understanding of microprocessor components and terminology

MEASUREMENT CRITERIA

1. Defined terms necessary to understand microprocessor components such as ALU DATA, index register, segment register, and internal bus.
2. Created a block diagram(s) for a typical microprocessor(s).

RESULTS:

Demonstrated knowledge of microprocessor components and terminology by the completion of each activity. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

G. Microprocessors

Skill: G.06 Understand principles and operation of types of microprocessor memory circuits

MEASUREMENT CRITERIA

1. Described types of microprocessor memory circuits which could include:
   a. ROM addressing schemes
   b. DRAM and SRAM addressing schemes
   c. EPROM addressing schemes
   d. DMA addressing schemes
2. Listed applications of microprocessing memory circuits.

RESULTS:

Demonstrated knowledge of the operation of types of microprocessor memory circuits by the completion of each activity. Work was completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

G. Microprocessors

Skill: G.07 Troubleshoot and repair types of microprocessor memory circuits

MEASUREMENT CRITERIA

1. Determined symptoms by comparing microprocessor memory circuit (fabricated or simulated) operation to specification(s).
2. Verified truth tables.
3. Analyzed microprocessor memory circuit(s) to locate fault(s).
4. Repaired microprocessor memory circuit(s).
5. Explained the procedure(s) and reason(s) for action(s) taken.

RESULTS:

Microprocessor memory circuit problems were correctly identified using appropriate equipment and troubleshooting procedures. Repairs were completed in a logical sequence. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

G. Microprocessors

Skill: G.08 Understand principles and operations of microprocessor machine code and instruction sets

MEASUREMENT CRITERIA

1. Explained the machine code and instruction sets.
2. Explained how machine code controls the microprocessor operations.

RESULTS:

Demonstrated knowledge of the principles and operation of microprocessor machine codes and instruction sets by the completion of this activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

H. Microcomputers

Skill: H.01 Demonstrate an understanding of microcomputer operating systems

MEASUREMENT CRITERIA

1. Explained purpose and functions of microcomputer operating systems.
2. Explained booting sequence.
3. Determined time and date codes for files.
4. Formatted disks.
5. Explained data storage and the use of sectors and tracks.
6. Checked for viruses on operating system.

RESULTS:

Demonstrated knowledge of microcomputer operating systems by the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

H. Microcomputers

Skill: H.02 Demonstrate an understanding of essential microcomputer components

MEASUREMENT CRITERIA

1. Explained microcomputer components needed for work functions.

RESULTS:

Demonstrated knowledge of microcomputer components by the completion of each activity. Work was completed in a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

H. Microcomputers

Skill: H.03 Demonstrate an understanding of microcomputer peripherals

MEASUREMENT CRITERIA

1. Identified peripherals connected to the microcomputer.
2. Explained the function of each peripheral and interface.

RESULTS:

Demonstrated knowledge of microcomputer peripherals by the completion of each activity. Work was completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

H. Microcomputers

Skill: H.04 Setup and configure a microcomputer using available operating systems and software packages

MEASUREMENT CRITERIA

1. Explained how to configure the microcomputer and install software packages.
2. Identified software needs for work environment.
3. Installed software packages.
4. Demonstrated operational procedures of system and software packages.

RESULTS:

Demonstrated knowledge of microcomputer configuration and operating systems by completing each activity: Accepted procedures for installing software and configuring to the microcomputer were followed. A functional microcomputer system was the result. All activities were completed within a reasonable time frame.

Occupation: Entry-Level Electronics Technician

Proficiency Area: Technical Skills

H. Microcomputers

Skill: H.05 Troubleshoot and replace microcomputer peripherals

MEASUREMENT CRITERIA

1. Determined symptoms by comparing microcomputer peripheral operations to specifications.
2. Analyzed problem using diagnostic software, knowledge, and manuals to determine cause of malfunction.
3. Replaced malfunctioning peripherals.
4. Explained the procedure(s) and reason(s) for action(s) taken.

RESULTS:

Identified malfunctions with microcomputer peripherals and replaced peripherals causing malfunctions. Acceptable troubleshooting procedures were followed. Repairs were accomplished and operation of peripherals were restored within a reasonable time frame.

INDEX

DESIRABLE BEHAVIOR AND WORK HABITS

I. DESIRABLE BEHAVIOR AND WORK HABITS

These traits, although not objectively measurable, are critical to the worker's overall employability and success. They are based upon the worker's ability to function in the workplace.

Included in Desirable Behavior and Work Habits are

A. Work Ethics and Behavior
B. Interpersonal Relationships
C. Teamwork

> Good employees demonstrate desirable traits and work habits unrelated to technical competency but equally important, for example, respect for co-workers, working well with others, capability for leadership, honesty, and reliability. Methods should be developed to teach and evaluate these traits. However, school transcripts do not cover behaviors, so internships or apprenticeships may be necessary to evaluate work habits and make the findings available.

I. DESIRABLE BEHAVIOR AND WORK HABITS

Estimated training time: Integral to all training.

A. Work Ethics and Behavior

A.01 Implement responsibilities of job position including exhibiting dependability and meeting organizationally defined expectations
A.02 Follow rules, regulations and policies as established including interpreting employer/employee handbook and procedures
A.03 Understand and practice cost effectiveness
A.04 Practice time management and follow work schedule
A.05 Assume responsibility for own decisions and actions
A.06 Exhibit pride
A.07 Display initiative in undertaking new tasks
A.08 Show assertiveness appropriate to the situation
A.09 Seek work challenges
A.10 Understand and apply ethical principles to decisionmaking
A.11 Comply with company standards including dress, personal hygiene and cleanliness
A.12 Understand the importance of providing good customer service (internal and external)

B. Interpersonal Relationships

B.01 Respond constructively to suggestions for improvement
B.02 Provide praise and suggestions for improvement
B.03 Channel/control emotional reactions constructively
B.04 Recognize problems and work toward their solution
B.05 Exhibit positive behavior
B.06 Exhibit sensitivity to internal and external customer needs
B.07 Treat people with respect
B.08 Recognize non-verbal communication

C. Teamwork

C.01 Understand interactive relationships required for effective teamwork
C.02 Understand team's operating procedures
C.03 Adapt as necessary to complete the team task
C.04 Evaluate outcome

TECHNICAL SKILLS

II. TECHNICAL SKILLS

The standards in this section are based upon the worker's ability to know the technical basis for and be able to explain how a product, device, circuit, or procedure works; to be able to apply that knowledge; and, as appropriate, to fabricate, demonstrate, troubleshoot, repair, or replace the product, device, or circuit.

Included in Technical Skills are

A. General Skills
B. DC Circuits
C. AC Circuits
D. Discrete Solid State Circuits
E. Analog Circuits
F. Digital Circuits
G. Microprocessors
H. Microcomputers

Equipment and materials for electronics training can be expensive. Companies should become involved in technical education at the policy, planning, and budgeting levels to validate needs and act as advocates for the schools and school systems. Companies should try to provide equipment and materials or allow access to theirs.

Many entry-level workers have difficulty troubleshooting a device to identify and locate a problem. They do not seem to understand what needs to be done, where to start, or how to proceed. Mastery of troubleshooting techniques as specifically defined in the skill standards should be incorporated into training.

Many students are being taught on obsolete equipment. They should have access to state-of-the-art test equipment and should learn on the same technologies they will see in the workplace. For example, they need to use printed circuits in place of "breadboards."

II. TECHNICAL SKILLS

A. General Estimated training time: 50 to 70 hours

A.01 Demonstrate an understanding of proper safety techniques for all types of circuits and components (DC circuits, AC circuits, analog circuits, digital circuits, discrete solid-state circuits, microprocessors)
A.02 Demonstrate an understanding of and comply with relevant OSHA safety standards
A.03 Demonstrate an understanding of proper troubleshooting techniques
A.04 Demonstrate an understanding of basic assembly skills using hand and power tools
A.05 Demonstrate an understanding of acceptable soldering/desoldering techniques, including through-hole and surface mount devices
A.06 Demonstrate an understanding of proper solderless connections
A.07 Demonstrate an understanding of use of data books and cross reference/technical manuals to specify and requisition electronic components
A.08 Demonstrate an understanding of the interpretation and creation of electronic schematics, technical drawings, and flow diagrams
A.09 Demonstrate an understanding of design curves, tables, graphs, and recording of data
A.10 Demonstrate an understanding of color codes and other component descriptors
A.11 Demonstrate an understanding of site electrical and environmental survey
A.12 Demonstrate the use of listening skills or assistive devices to assess signs and symptoms of malfunctions

B. DC Circuits
Estimated training time: 150 to 200 hours

B.01 Demonstrate an understanding of sources of electricity in DC circuits
B.02 Demonstrate an understanding of principles and operation of batteries
B.03 Demonstrate an understanding of the meaning of and relationships among and between voltage, current, resistance, and power in DC
B.04 Demonstrate an understanding of measurement of resistance of conductors and insulators and the computation of conductance
B.05 Demonstrate an understanding of application of Ohms Law to series, parallel and series-parallel circuits

B.06 Demonstrate an understanding of magnetic properties of circuits and devices
B.07 Demonstrate an understanding of the physical, electrical characteristics of capacitors and inductors
B.08 Understand principles and operations of DC series circuits
B.09 Fabricate and demonstrate DC series circuits
B.10 Troubleshoot and repair DC series circuits

B.11 Understand principles and operations of DC parallel circuits
B.12 Fabricate and demonstrate DC parallel circuits
B.13 Troubleshoot and repair DC parallel circuits

B.14 Understand the principles and operations of DC series-parallel and bridge circuits
B.15 Fabricate and demonstrate DC series-parallel and bridge circuits
B.16 Troubleshoot and repair DC series-parallel and bridge circuits
B.17 Understand the principles and operations of the Wheatstone Bridge
B.18 Understand principles and operations of DC voltage divider circuits (loaded and unloaded)
B.19 Fabricate and demonstrate DC voltage divider circuits (loaded and unloaded)
B.20 Troubleshoot and repair DC voltage divider circuits (loaded and unloaded)
B.21 Understand principles and operations of DC RC and RL circuits
B.22 Fabricate and demonstrate DC RC and RL circuits
B.23 Troubleshoot and repair DC RC and RL circuits

B.24 Demonstrate an understanding of measurement of power in DC circuits

C. AC Circuits
Estimated training time: 175 to 250 hours

C.01 Demonstrate an understanding of sources of electricity in AC circuits
C.02 Demonstrate an understanding of the properties of an AC signal
C.03 Demonstrate an understanding of the principles of operation and characteristics of sinusoidal and non-sinusoidal wave forms
C.04 Demonstrate an understanding of basic motor/generator theory and operation
C.05 Demonstrate an understanding of measurement of power in AC circuits
C.06 Demonstrate an understanding of the principle and

operation of various power conditioning: (isolation transformers, surge suppressors, uninterruptable power systems)

C.07 Demonstrate an understanding of the principle and operation of safety grounding systems: (lightning arresters, ground fault interrupters, etc.)

C.08 Understand principles and operations of AC capacitive circuits

C.09 Fabricate and demonstrate AC capacitive circuits

C.10 Troubleshoot and repair AC capacitive circuits

C.11 Understand principles and operations of AC inductive circuits

C.12 Fabricate and demonstrate AC inductive circuits

C.13 Troubleshoot and repair AC inductive circuits

C.14 Understand principles and operations of AC circuits using transformers

C.15 Demonstrate an understanding of impedance matching theory

C.16 Fabricate and demonstrate AC circuits using transformers

C.17 Troubleshoot and repair AC circuits using transformers

C.18 Understand principles and operations of AC differentiator and integrator circuits (determine RC and RL time constants)

C.19 Fabricate and demonstrate AC differentiator and integrator circuits

C.20 Troubleshoot and repair AC differentiator and integrator circuits

C.21 Understand principles and operations of AC series and parallel resonant circuits

C.22 Fabricate and demonstrate AC series and parallel resonant circuits

C.23 Troubleshoot and repair AC series and parallel resonant circuits

C.24 Understand principles and operations of AC RC, RL, and RLC circuits

C.25 Fabricate and demonstrate AC RC, RL, and RLC circuits

C.26 Troubleshoot and repair AC RC, RL, and RLC circuits

C.27 Understand principles and operations of AC frequency selective filter circuits

C.28 Fabricate and demonstrate AC frequency selective filter circuits

C.29 Troubleshoot and repair AC frequency selective filter circuits

C.30 Understand principles and operations of AC polyphase circuits

C.31 Understand principles and operations of AC phase locked loop circuits
C.32 Troubleshoot and repair AC phase locked loop circuits

D. Discrete Solid State Devices
Estimated training time: 175 to 250 hours

D.01 Demonstrate an understanding of the properties of semiconductor materials
D.02 Demonstrate an understanding of PN junctions
D.03 Demonstrate an understanding of bipolar transistors
D.04 Demonstrate an understanding of field effect transistors (FET's/MOS-FET's)
D.05 Demonstrate an understanding of special diodes and transistors
D.06 Understand principles and operations of diode circuits
D.07 Fabricate and demonstrate diode circuits
D.08 Troubleshoot and repair diode circuits
D.09 Understand principles and operations of optoelectronic circuits (gate isolators, interrupt sensors, infra red sensors, etc.)
D.10 Fabricate and demonstrate optoelectronic circuits (gate isolators, interrupt sensors, infra red sensors, etc.)
D.11 Troubleshoot and repair optoelectronic circuits (gate isolators, interrupt sensors, infra red sensors, etc.)
D.12 Understand principles and operations of single stage amplifiers
D.13 Fabricate and demonstrate single stage amplifiers
D.14 Troubleshoot and repair single stage amplifiers
D.15 Understand principles and operations of thyristor circuitry (SCR, TRIAC, DIAC, etc.)
D.16 Fabricate and demonstrate thyristor circuitry (SCR, TRIAC, DIAC, etc.)
D.17 Troubleshoot and repair thyristor circuitry (SCR, TRIAC, DIAC, etc.)

E. Analog Circuits
Estimated training time: 150 to 200 hours

E.01 Understand principles and operations of multistage amplifiers
E.02 Fabricate and demonstrate multistage amplifiers
E.03 Troubleshoot and repair multistage amplifiers
E.04 Understand principles and operations of IF circuits
E.05 Fabricate and demonstrate IF circuits
E.06 Troubleshoot and repair IF circuits

E.07 Understand principles and operations of linear power supplies and filters
E.08 Fabricate and demonstrate linear power supplies and filters
E.09 Troubleshoot and repair linear power supplies and filters
E.10 Understand principles and operations of operational amplifier circuits
E.11 Fabricate and demonstrate operational amplifier circuits
E.12 Troubleshoot and repair operational amplifier circuits
E.13 Understand principles and operations of audio power amplifiers
E.14 Fabricate and demonstrate audio power amplifiers
E.15 Troubleshoot and repair audio power amplifiers
E.16 Understand principles and operations of regulated and switching power supply circuits
E.17 Troubleshoot and repair regulated and switching power supply circuits
E.18 Understand principles and operations of active filter circuits
E.19 Troubleshoot and repair active filter circuits
E.20 Understand principles and operations of sinusoidal and non-sinusoidal oscillator circuits
E.21 Troubleshoot and repair sinusoidal and non-sinusoidal oscillator circuits
E.22 Understand principles and operations of fiber optic circuits using photodiodes or LASERS
E.23 Troubleshoot and repair fiber optic circuits using photodiodes or LASERS
E.24 Understand principles and operations of RF circuits
E.25 Fabricate and demonstrate RF circuits
E.26 Troubleshoot and repair RF circuits
E.27 Understand principles and operations of signal modulation systems (AM, FM, stereo)
E.28 Troubleshoot and repair signal modulation systems (AM, FM, stereo)
E.29 Demonstrate an understanding of motor phase shift control circuits
E.30 Understand the principles and operations of microwave circuits

F. Digital Circuits
Estimated training time: 250 to 300 hours

F.01 Demonstrate an understanding of the characteristics of integrated circuit (IC) logic families
F.02 Demonstrate an understanding of minimizing logic circuits using Boolean operations

F.03 Understand principles and operations of linear integrated circuits
F.04 Troubleshoot and repair linear integrated circuits
F.05 Understand principles and operations of types of logic gates
F.06 Fabricate and demonstrate types of logic gates
F.07 Troubleshoot and repair types of logic gates
F.08 Understand principles and operations of combinational logic circuits
F.09 Fabricate and demonstrate combinational logic circuits
F.10 Troubleshoot and repair combinational logic circuits
F.11 Understand principles and operations of types of flip-flop circuits
F.12 Fabricate and demonstrate types of flip-flop circuits
F.13 Troubleshoot and repair flip-flop circuits
F.14 Understand principles and operations of types of registers and counters
F.15 Fabricate and demonstrate types of registers and counters
F.16 Troubleshoot and repair types of registers and counters
F.17 Understand principles and operations of clock and timing circuits
F.18 Fabricate and demonstrate clock and timing circuits
F.19 Troubleshoot and repair clock and timing circuits
F.20 Understand principles and operations of types of arithmetic-logic circuits
F.21 Troubleshoot and repair types of arithmetic-logic circuits
F.22 Understand principles and operations of types of multiplexer and demultiplexer circuits
F.23 Troubleshoot and repair types of multiplexer and demultiplexer circuits
F.24 Understand principles and operations of types of digital to analog and analog to digital circuits
F.25 Troubleshoot and repair types of digital to analog and analog to digital circuits
F.26 Understand principles and operations of types of digital display circuits
F.27 Troubleshoot and repair types of digital display circuits
F.28 Understand principles and operations of power distribution noise problems
F.29 Troubleshoot and repair power distribution noise problems
F.30 Understand principles and operations of types of digital encoders and decoders
F.31 Troubleshoot and repair types of digital encoders

and decoders
- F.32 Understand principles and operations of digital display devices
- F.33 Troubleshoot and repair digital display devices

G. Microprocessors
Estimated training time: 150 to 200 hours

- G.01 Demonstrate an understanding of microprocessor interfaces
- G.02 Troubleshoot and repair microprocessor interfaces
- G.03 Demonstrate an understanding of essential microprocessor components
- G.04 Demonstrate an understanding of microprocessor BUS concepts
- G.05 Demonstrate an understanding of microprocessor components and terminology
- G.06 Understand principles and operation of types of microprocessor memory circuits
- G.07 Troubleshoot and repair types of microprocessor memory circuits
- G.08 Understand principles and operations of Microprocessor machine code and instruction sets

H. Microcomputers
Estimated training time: 100 to 150 hours

- H.01 Demonstrate an understanding of microcomputer operating systems
- H.02 Demonstrate an understanding of essential microcomputer components
- H.03 Demonstrate an understanding of microcomputer peripherals
- H.04 Set up and configure a microcomputer using available operating systems and software packages
- H.05 Troubleshoot and replace microcomputer peripherals

TEST EQUIPMENT AND TOOLS

III. TEST EQUIPMENT AND TOOLS

The standards in this section are based upon the worker's ability to know and understand how the test equipment or tool works and when, where, and how to use it.

III. TEST EQUIPMENT AND TOOLS

Estimated training time: 50 to 100 hours (in addition to technical training)

01 Breakout box
02 Calibration standards
03 Capacitor/inductor analyzer
04 Current probe
05 DC power source
06 Digital storage oscilloscope
07 Dummy load
08 Electrical field strength meter
09 Electrical resistance insulation tester
10 Electrostatic discharge meter (ESD)
11 Frequency counter
12 Function generator
13 Ground fault testers
14 Hand tools
15 High potential testers
16 Isolation transformer
17 LASER power meter
18 Light intensity meter
19 Logic analyzer
20 Logic probe
21 Logic pulser
22 Multimeters (digital and analog)
23 Oscilloscope
24 Power tools
25 Pressure gauges
26 RF power meter
27 RF signal generator
28 Semiconductor tester
29 Soldering/desoldering equipment and supplies
30 Soldering/desoldering equipment and supplies for surface mount devices (SMD)
31 Spectrum analyzer
32 Temperature transducer
33 Torque measuring tools
34 Vacuum gauges
35 Voltage Isolation Transformer (adjustable)

BASIC AND PRACTICAL SKILLS

IV. BASIC AND PRACTICAL SKILLS

The standards in this section are based upon the worker's ability to perform a process or apply knowledge.

Included in Basic and Practical Skills are

A. Technical Literacy
B. Communicating on the Job
C. Solving Problems and Critical Thinking
D. Reading
E. Proficiency in Mathematics
F. Proficiency in Physics

> Many instructors face the challenge of generating and maintaining students' interest during training. Relating electronics theory to products or components seen in everyday life should highlight the practical application of the material being taught and help to stimulate interest in the material.

IV. BASIC AND PRACTICAL SKILLS

Estimated training time: 250 to 350 hours

A. Technical Literacy

A.01 Demonstrate basic keyboarding skills
A.02 Demonstrate ability to use standard applications software such as word processors, database management, and spreadsheets
A.03 Maintain state-of-the-art skills through participation in in-service or other training
A.04 Participate in continuing education
A.05 Understand and apply continuous improvement principles (see Data Analysis)
A.06 Demonstrate knowledge of the business products/services

B. Communicating on the Job

B.01 Use effective written and other communication skills
B.02 Use telephone etiquette including relaying messages accurately
B.03 Employ appropriate skills for gathering and retaining information
B.04 Interpret written, graphic and oral instructions
B.05 Interact with co-workers and customers in a logical, clear and understandable manner
B.06 Use language appropriate to the situation
B.07 Participate in meetings in a positive and constructive manner
B.08 Use job-related terminology
B.09 Write technical reports, letters and memoranda as appropriate to the audience (e.g., management, customers, co-workers, and manufacturers)
B.10 Document work projects, procedures, tests, and equipment failures

C. Solving Problems and Critical Thinking

C.01 Identify the problem
C.02 Clarify purposes and goals
C.03 Identify available solutions and their impact including evaluating credibility of information, and locating information
C.04 Evaluate options
C.05 Set priorities
C.06 Select/implement options/decisions including predicting results of proposed action
C.07 Organize personal workloads

C.08 Participate in brainstorming sessions to generate new ideas and solve problems

D. Reading

D.01 Read and apply various sources of technical information (e.g., manufacturer literature, codes and regulations)

E. Proficiency in Mathematics

General

E.01 Determine if a solution is reasonable
E.02 Demonstrate ability to use a simple electronic calculator

Numbers and Number Relations

E.03 Round and/or truncate numbers to designated place value
E.04 Compare order and determine equivalences of real numbers (e.g., fractions, decimals, percentages)
E.05 Solve problems and make applications involving integers, fractions, decimals, percentages, and ratios using order of operations
E.06 Translate written and/or verbal statements into mathematical expressions
E.07 Compare, compute, and solve problems involving binary, octal, decimal, and hexadecimal numbering systems

Measurement

E.08 Convert, compare, and compute with common units of measurement within and across measurement systems
E.09 Read scale on measurement device(s) and make interpolations where appropriate

Data Analysis

E.10 Understand statistical terms and charts needed for interpretation of continuous improvement processes
E.11 Collect and organize data into tables, charts, and/or graphs
E.12 Interpret and use tables, charts, maps, and/or graphs
E.13 Identify patterns, note trends, and/or draw conclusions from tables, charts, maps, and/or graphs
E.14 Compute and interpret mean, median, and/or mode

Algebra

E.15 Simplify and solve algebraic expressions and formulas
E.16 Select and use formulas appropriately
E.17 Understand and use scientific notation
E.18 Use properties of exponents and logarithms
E.19 Determine slope, midpoint and distance
E.20 Graph functions
E.21 Use Boolean algebra to break down logic circuits

Geometry

E.22 Determine perimeters and areas of geometric figures
E.23 Determine surface areas and volumes of applicable geometric figures
E.24 Recognize, classify, and use properties of lines and angles
E.25 Recognize, classify, and use properties of two- and three- dimensional figures (e.g., circles, triangles, rectangles, cylinders)
E.26 Apply Pythagorean theorem

Trigonometry

E.27 Identify basic functions of sine, cosine, and tangent
E.28 Compute and solve problems using basic trigonometric functions
E.29 Graph basic functions using polar and/or Cartesian coordinate systems

F. Proficiency in Physics

F.01 Understand fundamental principles of mechanics
F.02 Understand fundamental principles of pneumatics
F.03 Understand fundamental principles of hydraulics
F.04 Understand principles of electricity including its relationship to the nature of matter

ADDITIONAL SKILLS

V. ADDITIONAL SKILLS

Three skill areas have been identified as having a sufficiently broad application in electronics to be included in the training of a work-ready, entry-level electronics technician, not at a detailed level but at a level that provides the technician with a basic overview and understanding of the subject matter. By having this basic understanding the technician will gain the ability at least to recognize, understand, and describe problems that may require expert assistance.

Included in Additional Skills are

A. Communications
B. Electromechanics
C. LASER Applications

V. ADDITIONAL SKILLS

A. Communications
Estimated training time: 10 to 20 hours

- A.01 Transmission line applications
- A.02 Antenna systems
- A.03 Types of multiplexing systems
- A.04 Data communications
- A.05 Types of telephone switching systems
- A.06 Microwave communications systems

B. Electromechanics
Estimated training time: 50 to 75 hours

- B.01 Servomechanisms, motors, and motor control circuits
  - a. Power distribution systems
  - b. Relays and relay circuits
  - c. Protection circuits
  - d. Types of motor controllers
  - e. Types of motors
- B.02 Hydraulic and pneumatic systems
- B.03 Mechanical power transmission systems
  - a. Measuring instruments
  - b. Compound and reverted gear trains
  - c. Internal and planetary gear trains
  - d. Helical and bevel gear trains
  - e. Rack and pinion mechanisms
  - f. Worm and wheel mechanisms
  - g. Block and screw mechanisms
  - h. Counter rotating mechanisms and differentials, etc.
- B.04 Vacuum systems and components
- B.05 Mechanisms, linkages and levers
- B.06 Transducers and instrumentation
- B.07 Industrial materials
- B.08 Automatic controls and robotics

C. LASER Applications
Estimated training time: 5 to 10 hours

- C.01 Welding, cutting and drilling
- C.02 Data recording and manipulation
- C.03 Environmental testing and monitoring
- C.04 Nondestructive testing
- C.05 Measurement
- C.06 Communications
- C.07 Fiber optics and lasers
- C.08 Lasers in medicine
- C.09 Holography/interferometry